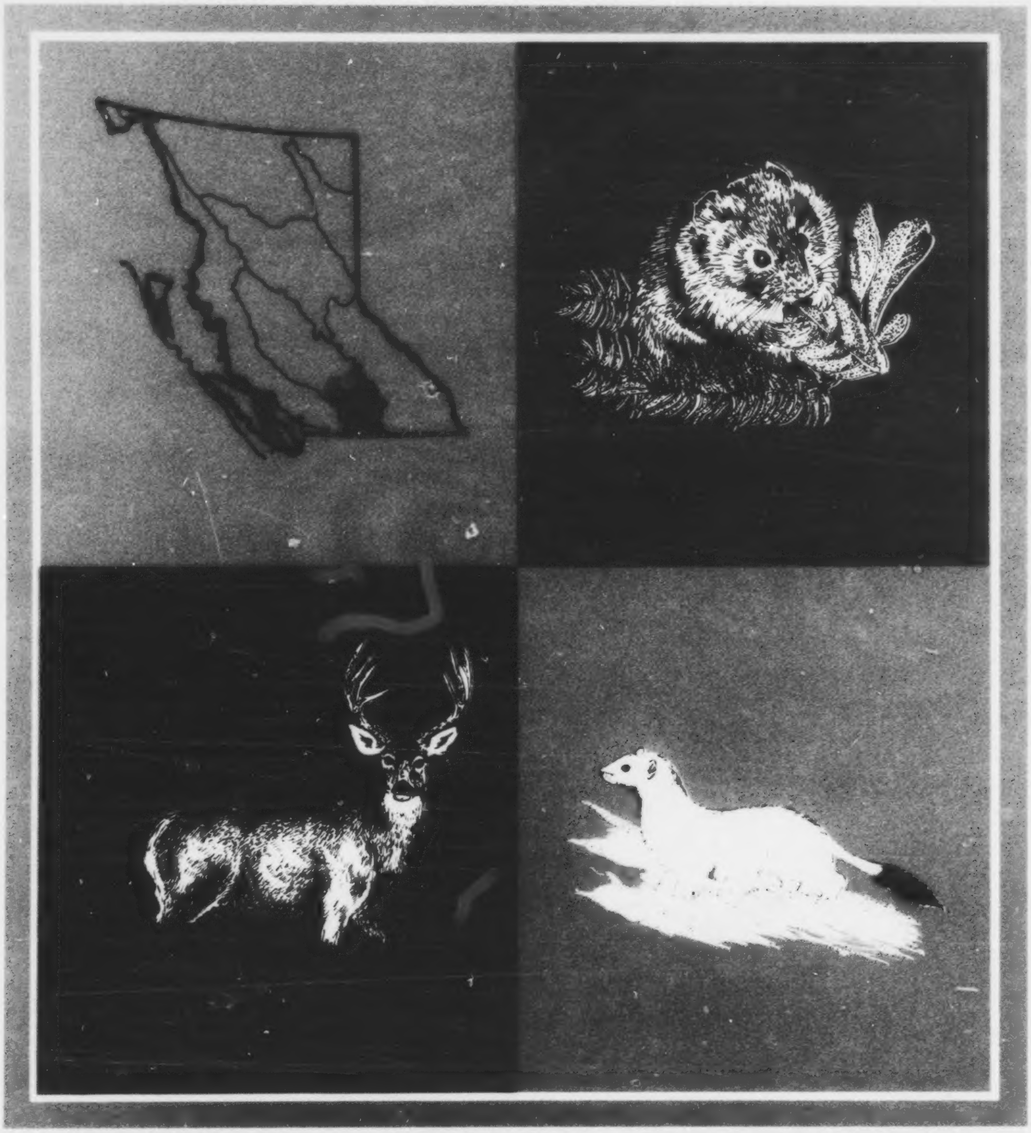
WILDLIFE HABITAT Handbook

for the Southern Interior Ecoprovince



Vol. 1 Species Notes for Mammals

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Ministry of Environment
Ministry of Forests

WILDLIFE HABITAT HANDBOOKS FOR THE SOUTHERN INTERIOR ECOPROVINCE

VOLUME 1:
SPECIES NOTES FOR MAMMALS

Victoria Stevens
and
Susan Lofts

A cooperative effort of the
Ministry of Environment (Wildlife Branch),
the Ministry of Forests (Research Branch),
and Wildlife Habitat Canada

Andrew P. Harcombe
Technical Editor
Wildlife Branch
Ministry of Environment
Victoria, B.C.

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1988

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PREFACE

This publication is part of the series "Wildlife Habitat Handbooks of the Southern Interior Ecoprovince". The purpose of this series is to provide forest, wildlife, and range managers with the knowledge and tools to assess impacts of various land management practices on wildlife and its habitat. Basic to this assessment process is an understanding of wildlife's relationship to habitat.

The information in this series applies specifically to the Southern Interior Ecoprovince and similar ecosystems in the southern area of British Columbia. The principles and processes described, however, apply generally to all managed forests and rangelands, when the welfare of wildlife is affected by land management decisions.

The series is a comprehensive package composed of eleven separate volumes. Although each part will be an independent treatment of a specific subject, when combined in sequence, the individual parts will be as chapters in a book. The final sequence is shown on the inside back cover of this publication, but individual chapters will be printed as they become available. Though this ensures that the information will be used as quickly as possible, the order of production will not be the same as the final organized order.

"Wildlife Habitat Handbooks of the Southern Interior Ecoprovince" is a cooperative effort of the British Columbia Ministries of Environment (Wildlife Branch, Fisheries Branch), the Ministry of Forests (Research Branch), the Ministry of Municipal Affairs, Recreation, and Culture (Royal British Columbia Museum), the University of British Columbia and Simon Fraser University, and the Canadian Wildlife Service.

Andrew P. Harcombe
Technical Editor
Victoria, B.C.

ACKNOWLEDGEMENTS

This wildlife habitat handbook volume was funded by the Research Branch of the Ministry of Forests and the Wildlife Branch of the Ministry of Environment.

The production of this report depended strongly on the access to literature provided by the Vertebrate Zoology Division of the Royal British Columbia Museum, primarily through R. Wayne Campbell, and on the editorial comments provided by a host of species experts (see Appendix 5.4).

This publication is truly a joint effort of the authors and the editors. Victoria Stevens wrote most of the initial draft of the species notes. Susan Lofts reformatted notes based on revision in the working plan product guides written by Andrew Harcombe. Susan also added some species notes and organized the references.

The authors would like to thank Lynne Foxall for her long-suffering patience in typing this document. Spenser Sutton of Atlas Designworks prepared the distribution maps and the overall note design. All mammal illustrations were painstakingly prepared by Laura Friis. Tracy Hooper, Linda Stordeur and Elizabeth Stanlake spent long hours editing and preparing this manuscript for publication. Cover design was by Nicholas Newback. Other graphics were prepared by Gail Harcombe and Glenn Kubian.

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CONTENTS

1. INTRODUCTION 3
2. SPECIES NOTES 9
3. REFERENCES CITED 151
4. INDEX TO SPECIES 163

5. APPENDICES

5.1 Phylogenetic Listing 169
5.2 General Mammal Texts 172
5.3 Glossary 173
5.4 List of Reviewers of Mammal Species Notes 174

1

Introduction

1. INTRODUCTION

The major wildlife goal in British Columbia is to maintain the diversity of species. This is a difficult goal to achieve with the large number of species, habitats, and land use activities. For most species, the desired information for management is scanty, scattered, and descriptive. Thus it is difficult to predict outcomes of land use practices on habitat and on wildlife, especially with few staff, low budgets, and high rates of habitat change.

The wildlife habitat handbook project was initiated to develop planning tools to aid wildlife habitat managers in predicting consequences of management activities on habitat and therefore on wildlife. Two major premises of this handbook are:

1) most wildlife habitat will be managed indirectly by influencing other resource managers to modify their activities for the benefit of wildlife;
2) all wildlife species and their habitat requirements must be considered in the process.

This handbook system organizes biological data for various ecosystems or habitats, in a framework that assists resource managers in predicting consequences and in developing alternatives. It is based on similar approaches to species diversity management in the United States. Our approach was to begin with a pilot study in the Southern Interior Ecoprovince (see Figures 1 and 2).

The following report is the "mammal" component of the information base we call species notes [1]. These notes present knowledge of habitat requirements for terrestrial vertebrates in a readable, understandable format. They summarize the literature describing the distribution, habitat requirements, and selected life history characteristics, from a *provincial* perspective, for the 70 mammal species occurring in the Southern Interior Ecoprovince. The notes provide the literature data-base for developing the species-habitat relationship models that will indicate suitability values for wildlife species for each major wildlife habitat.

The species notes were compiled with an emphasis on information specific to British Columbia. The main source of information was the literature collected at the Royal British Columbia Museum for the mammal bibliography (in prep.). An extensive search of the information collected by the museum up to September 1984 was conducted. Since many species are not adequately covered in British Columbia studies, we used information from general mammal texts along with other literature relevant to the Pacific Northwest. Some general texts are listed in Appendix 5.2. Additional information was provided by various biologists who reviewed notes on species within their area of expertise (See Appendix 5.4).

The species notes are starting points for information on the habitat requirements of mammals in British Columbia. For some species, especially some of the bats and other small mammals, little information is currently available, as noted in regional wildlife planning documents. Information from future studies and field work can be incorporated into the wildlife habitat handbooks to update and refine existing knowledge.

1.1 Annotated Format of Species Notes

All species notes follow the same format, with information arranged under the following categories:

Taxonomy: each species note is headed by the common name, scientific name and taxonomic code, taken from Campbell and Harcombe (1985).

Synonyms: common names used in Cowan and Guiget (1973), Banfield (1974) and van Zyll de Jong (1983, 1985) are also given, since these references may be used for species identification or additional biological information.

Distribution, Seasonality and Abundance: a summary statement of abundance and provincial distribution. Abundance is assessed within suitable habitat and rated subjectively by the terms abundant, common, sparse, and rare. Seasonality (or season of occurrence) is only applicable to some of the migratory bat species. All other mammal species are resident.

Habitat Requirements: divided by three main life requisites:

Reproduction: includes information on courtship areas and reproductive sites (nesting or denning).

Feeding: includes information on food habits, foraging substrates and foraging cover.

Special Needs: includes information on roosting/resting sites, hiding/escape cover, thermal cover, and hibernation/aestivation sites.

Within each of these broad categories, habitat requirements are subdivided into habitat classes and specific habitat elements.

Habitat Classes: in some cases, information from the literature allowed only general habitat classes to be used whereas more detailed habitats could be described for other species that have been studied extensively (Harcombe and Lea, in prep.).

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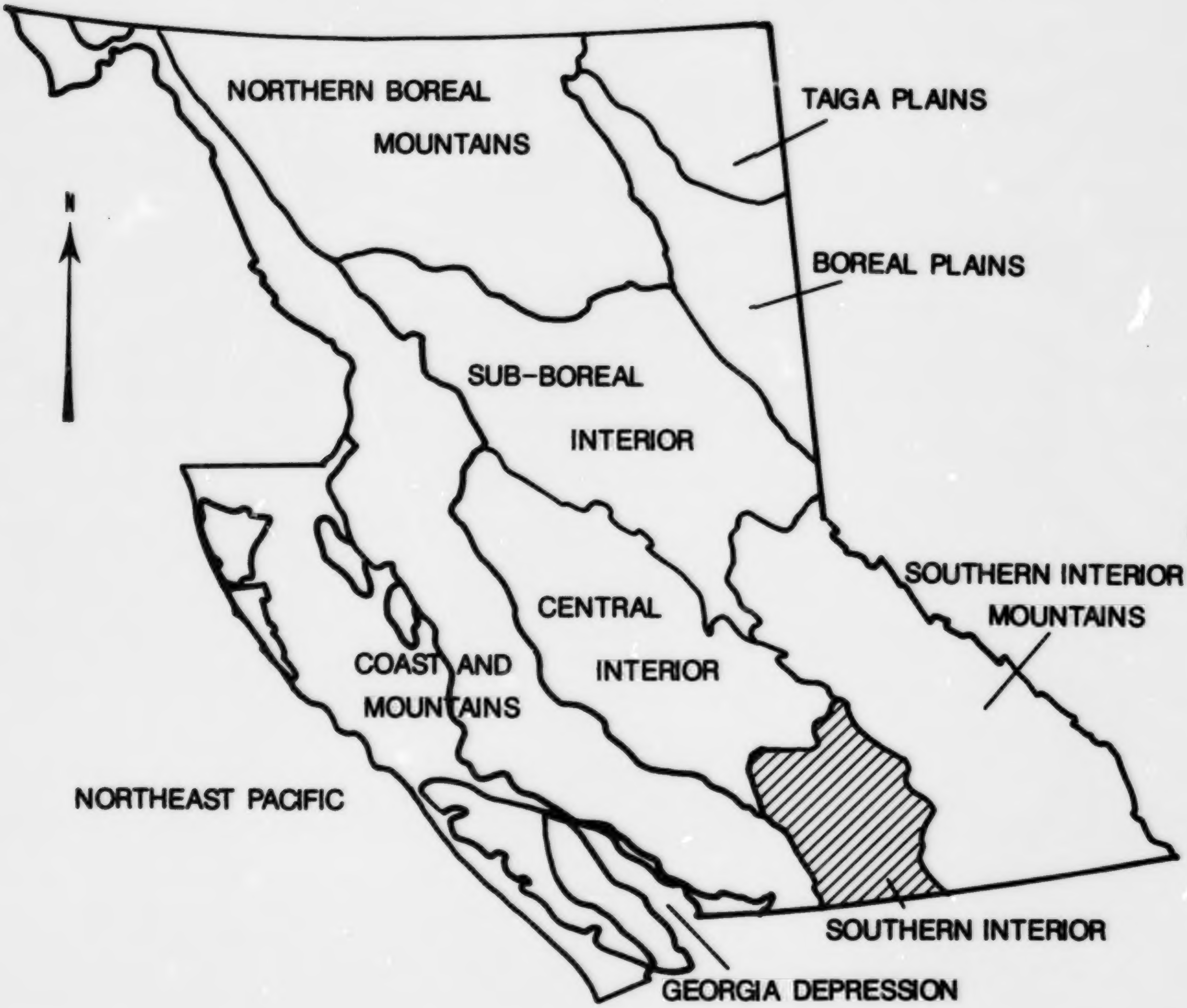
[1] also called species narratives or species profiles in other reports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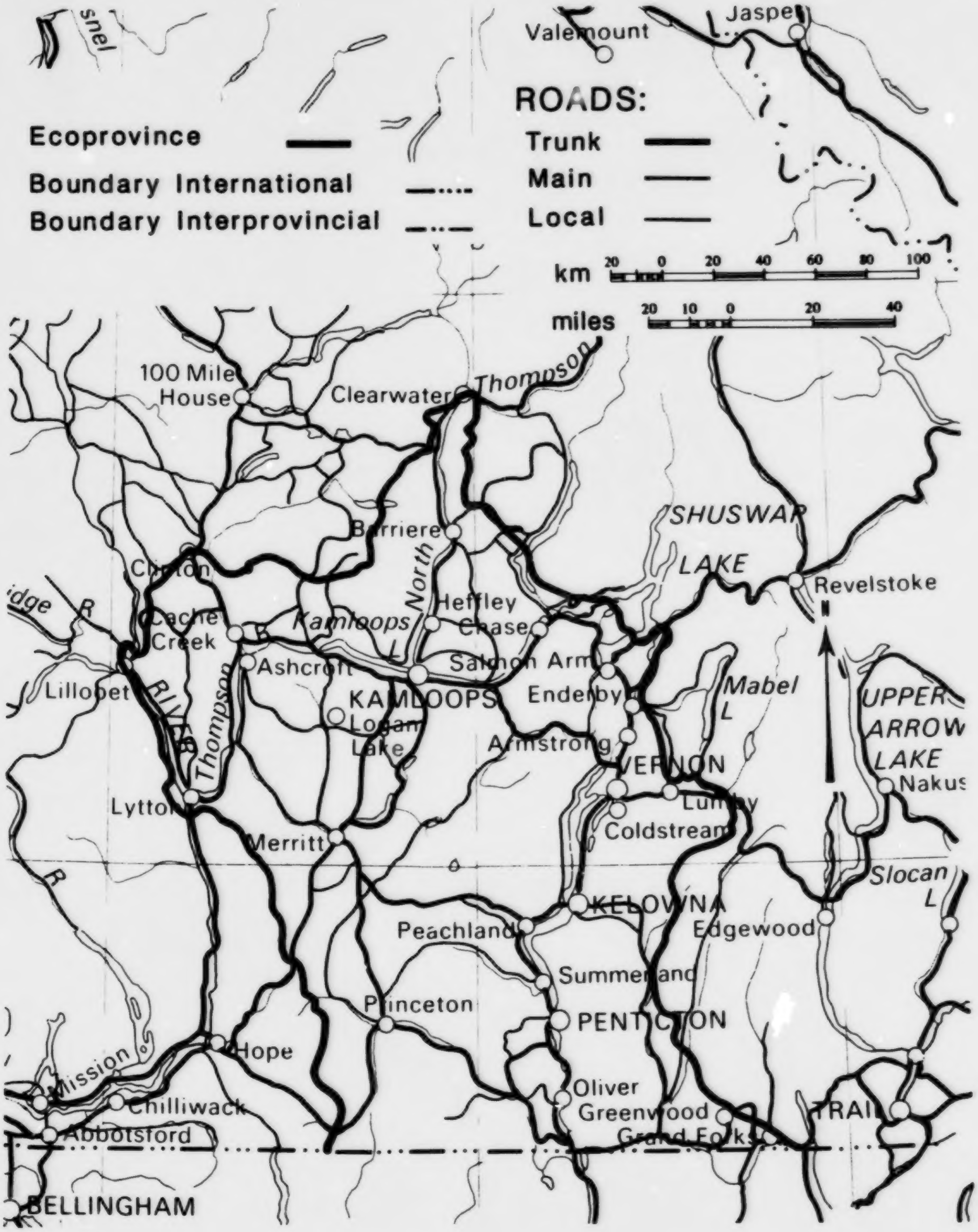
TAIGA PLAINS
N
BOREAL PLAINS
SUB-BOREAL INTERIOR
SOUTHERN INTERIOR MOUNTAINS
CENTRAL INTERIOR
COAST AND MOUNTAINS
NORTHEAST PACIFIC
SOUTHERN INTERIOR
GEORGIA DEPRESSION

Figure 1. Location of the Southern Interior Ecoprovince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Slocan L
KELOWNA
Peachland
Edgewood
Summerland
Princeton
PENTICTON
Mission
Hope
Chilliwack
Abbotsford
Oliver
Greenwood
Grand Forks
TRAI
BELLINGHAM

Figure 2. The Southern Interior Ecoprovince

Specific Habitat Elements: site-specific factors that enhance a habitat class for use by a particular species. Includes information on food habits and other details such as a requirement for tree cavities for nesting or well-drained soil for burrowing.

Habitat Requirements - Pattern: when necessary, this section is used to describe the relationship between the various habitat requirements when more than one habitat is required. For example, a species may forage in lowland wet meadows but require nearby shrub cover for hiding.

Territory/Home Range: includes information on territory and home range sizes, sometimes stratified by age and/or sex class. Territory is defined as part of the home range defended against other species or members of the same species. Home range is the area covered by an individual animal carrying out its life requisites.

Activity and Movement Patterns: includes daily and seasonal activity patterns, migration, and juvenile dispersal.

Status: includes a designation (not in jeopardy, special, threatened, endangered, or indeterminate) based on Munro and Low (1979), and legal status. If no legal status is mentioned, the species is not protected by the current laws.

Other: miscellaneous comments relating to niche, relationship to other vertebrates, specific management recommendations, etc.

Selected References: a short list of references, for additional or more detailed information.

Distribution Maps: accompany each species note (except House Mouse and Norway Rat) and show the approximate provincial distribution. Maps were based primarily on four sources: *The Mammals of British Columbia* (Cowan and Guiguet 1973), *Mammals of Canada* Banfield (1974), *Handbook of Canadian Mammals* (*Marsupials, Insectivores, and Bats*) (van Zyll de Jong 1983, 1985), and the *British Columbia Wildlife Distribution Mapping Generalized Big Game Series* (B.C. Ministry of Environment 1978). Cowan and Guiguet (1973) and Banfield (1974) are outdated and may be inaccurate in some cases; however better information is unavailable at this time. The Royal British Columbia Museum is undertaking a vertebrate atlas program that will provide up-to-date information on the life history and distribution of all British Columbia mammals. This information will be incorporated into future wildlife habitat handbooks.

Finally, a glossary (Appendix 5.3) is provided to define some of the terms used in the mammal species notes.

2

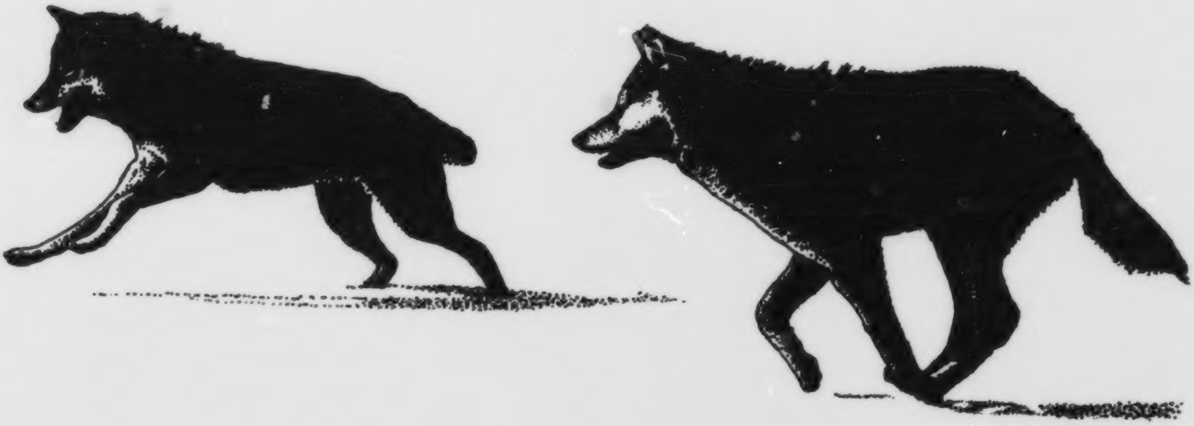
Species Notes

2.0 SPECIES NOTES

The following species notes follow the phylogenetic sequence listed in Appendix 5.1. Each species note is structured in a two-page format, with the distribution map facing the written text (except for House Mouse and Norway Rat); only the text pages are paginated. The index (section 4.0) contains all common names, scientific names, or synonyms found in the notes themselves.

One very special group of mammals found in the Southern Interior are bats. In fact, the southern Okanagan valley has the highest bat diversity found in Canada. Rather than repeating some information for the 13 bats in this publication, the following are some general observations applicable to bats:

1. There is very little known specifically about British Columbia bat populations outside the Okanagan. Current research is being conducted in the Okanagan Valley by Brock Fenton and his students (Ontario).
2. Abundance is not well known for any of the bat species. Therefore it is not possible to give Munro and Low (1979) status ratings. The most reasonable status categories are described for each species using available information.
3. The highest density and diversity of bat species in British Columbia and perhaps all of Canada is found in the Okanagan Valley (Fenton *et al.* 1980).
4. All British Columbia bats are primarily insectivorous and therefore may be beneficial in controlling insect populations.
5. None of the bat species are considered territorial nor do they have currently definable home ranges. However, some information about their sociality and attachment to feeding, roosting or hibernation sites may be of use to managers and will be included in the species accounts in place of Territory/Home Range.



Masked Shrew
SOCI
Sorex cinereus Kerr
[Cinereus Shrew, Common Shrew]

Distribution, Seasonality and Abundance

Not common although it may occur throughout mainland of the province and on some islands (not Vancouver Island or the Queen Charlottes) from low elevations up to 2500 m. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Reproduces in a broad range of wet or dry forested habitats such as boreal white spruce forests, Engelmann spruce - subalpine fir forests as well as lowland and alpine/subalpine wet meadows and wetland habitats.

SPECIFIC HABITAT ELEMENTS: Young are born in a nest of grass under suitable cover such as a log or rock.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; like other shrews, forage in runways along the ground and may also forage in trees. Have been found along lake edges, stable talus slopes and grassy ditches of hay fields.

SPECIFIC HABITAT ELEMENTS: Forages on small invertebrates such as insects and their larvae, earthworms, isopods, snails, millipedes and centipedes, and some seeds. May prey on the eggs of small tree nesting birds, small vertebrates such as young mice and salamanders.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Humidity seems to be a restricting factor. May colonize open fields during humid periods but retreat to moister areas when grasslands are dry. Require escape cover such as a dense herbaceous layer, decayed logs, or forest litter.

Territory/Home Range

Will defend nest and surrounding territory. Home range estimated at 0.04 ha (Banfield 1974).

Activity and Movement Pattern

Active throughout 24-hour period with short-term periods of activity and rest. Active all year.

Status

Not in jeopardy. Not protected.

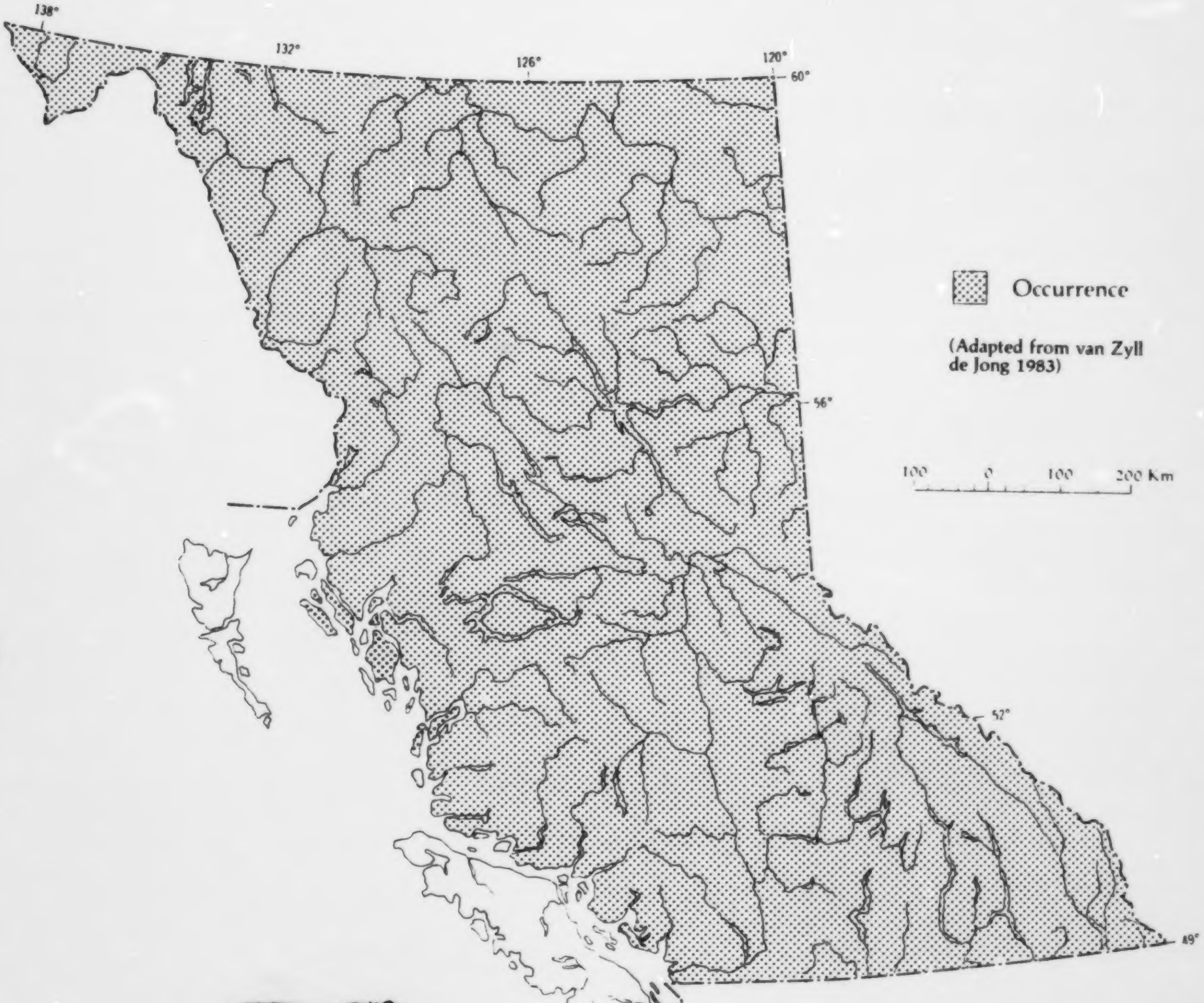
Other

May use echolocation.

Selected References

Banfield 1974; Ingles 1965; van Zyll de Jong 1983.

Masked Shrew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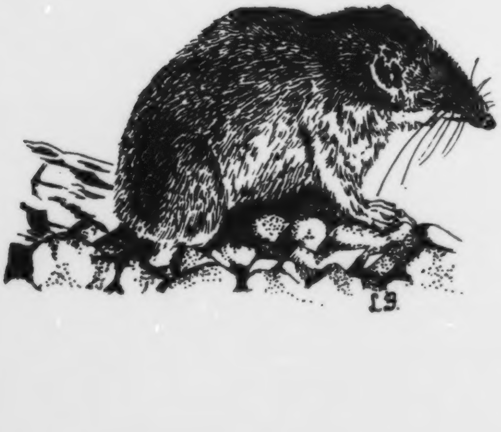


Vagrant Shrew
SOVA
Sorex vagrans Baird
[Wandering Shrew]

Distribution, Seasonality and Abundance

In Canada occurs only in British Columbia. Found across Vancouver Island, on some of the Gulf Islands, and the lower mainland. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Reproduce in a variety of habitat classes including moist forested habitats, deciduous riparian forests, wetland habitats, and open grassy habitats.

SPECIFIC HABITAT ELEMENTS: Young are born in nests of dry grass constructed in decayed logs, stumps, burrows, and under boards and large pieces of bark. Prefer moist, rich soils with low acidity.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproductive requirements; foraging usually occurs close to water such as marshes and streams and may also be found in riparian inclusions, thickets, and along roadsides.

SPECIFIC HABITAT ELEMENTS: Diet consists primarily of invertebrates such as insects, spiders, and earthworms but also includes small amphibians, carrion, and some seeds. May store food for future use. On average, Vagrant Shrews eat 1.68 times their body weight in food per day (Broadbooks 1939). Forage in runways under logs, leaf litter, and fallen grass.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require escape cover such as runways, dense herbaceous and/or shrub layer, and forest litter.

Territory/Home Range

Home range size increases with the onset of reproductive activities, especially among males. The home range size of breeding females is twice that of non-breeding females. Average home range size on the Oregon coast was 372 m^2 (range: 24-834 m^2) (Ingles 1961). In southern British Columbia home range for non-breeding females was 1039 m^2 while breeding females increased their range to 3258 m^2 (van Zyll de Jong 1983). Home ranges overlap and only the nest is defended.

Activity and Movement Patterns

Solitary. Active all year, predominantly at night.

Status

Not in jeopardy. Not protected.

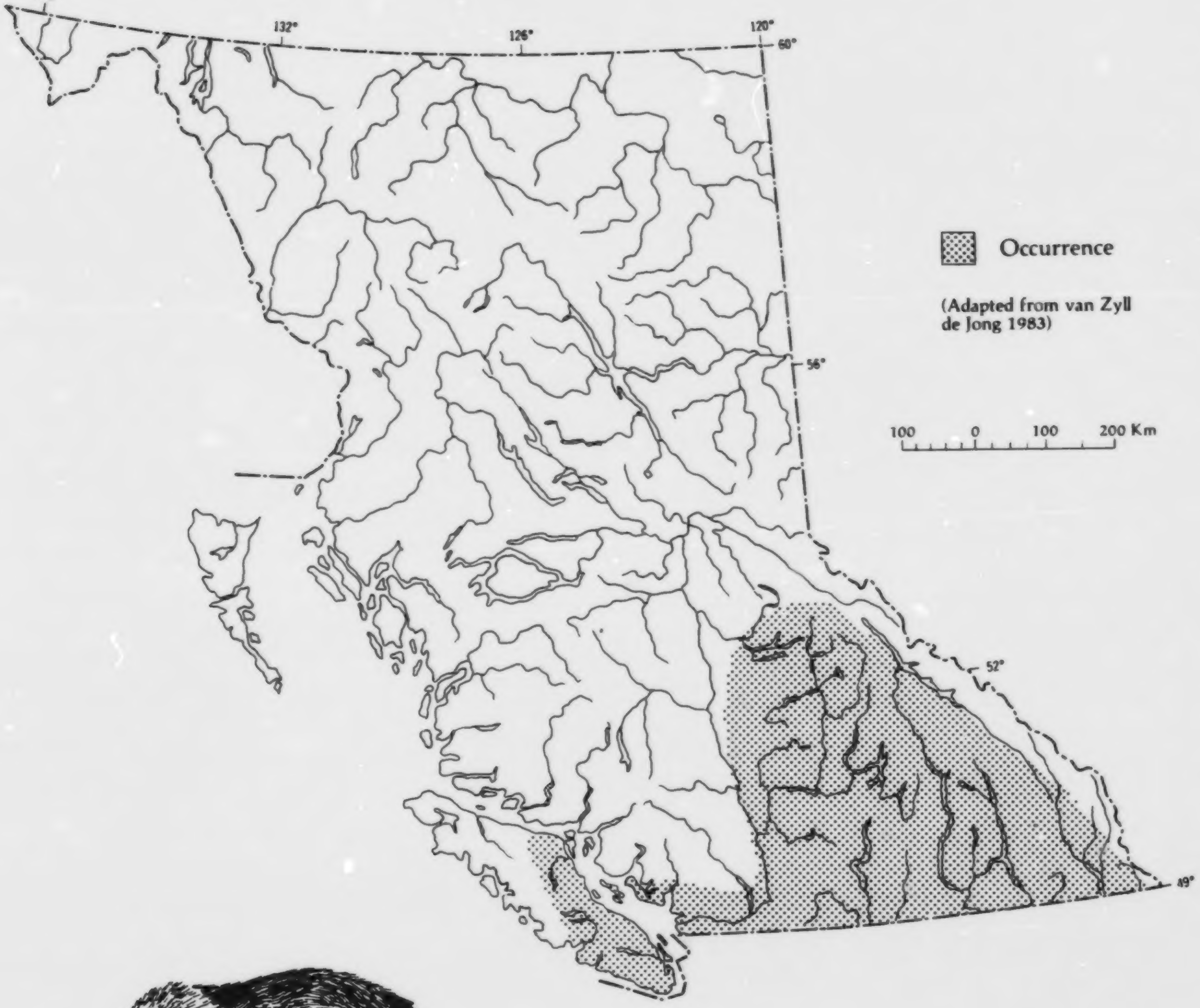
Other

Use the runways of other species, especially *Microtus* spp. (voles). Echolocation has been demonstrated.

Selected References

Hawes 1977; Hooven *et al.* 1975; Ingles 1961, 1965; Maser *et al.* 1981; van Zyll de Jong 1983.

Vagrant Shrew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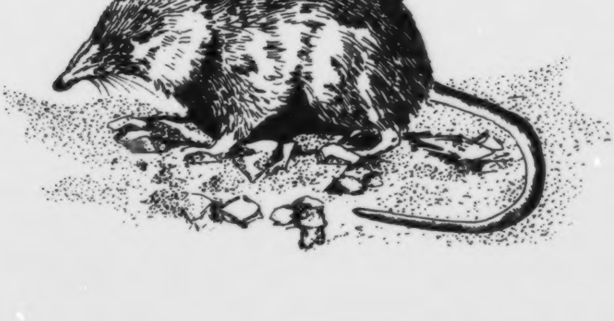


Dusky Shrew
SOMO
Sorex monticolus Merriam
[Montane Shrew]

Distribution, Seasonality and Abundance

Occurs throughout the province including Vancouver Island, the Queen Charlottes, and many other offshore islands. Native yearlong resident. Abundance in British Columbia is unknown.

Habitat Requirements - Reproduction

HABITAT CLASSES: No strong habitat preference. Ranges from montane, boreal, and coastal coniferous forests to alpine/subalpine wet meadows and alpine tundra. Also occurs in wetland habitats and moist locations in the arid portion of south-central British Columbia.

SPECIFIC HABITAT ELEMENTS: Young are born in a grass nest, usually constructed in a decaying log, stump, forest litter, or hole in the ground.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. May forage along lake edges, in grassy ditches, riparian inclusions, and hay fields. Forage along trail systems in ground surface duff or under grass. Seldom found far from marshes or streams.

SPECIFIC HABITAT ELEMENTS: Feed primarily on invertebrates such as insects, spiders, snails, and worms.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require some form of ground cover such as duff, litter, or an herbaceous layer for runways used as escape cover. Also use vole runways.

Territory/Home Range

Solitary. Home range size in a Pacific Coast area varied with age of animal and season from 0.003 to 0.07 ha (mean of 0.04 ha) (Hawes 1977).

Activity and Movement Patterns

Active all year. Activity cycle of feeding and resting every 3 to 4 hours.

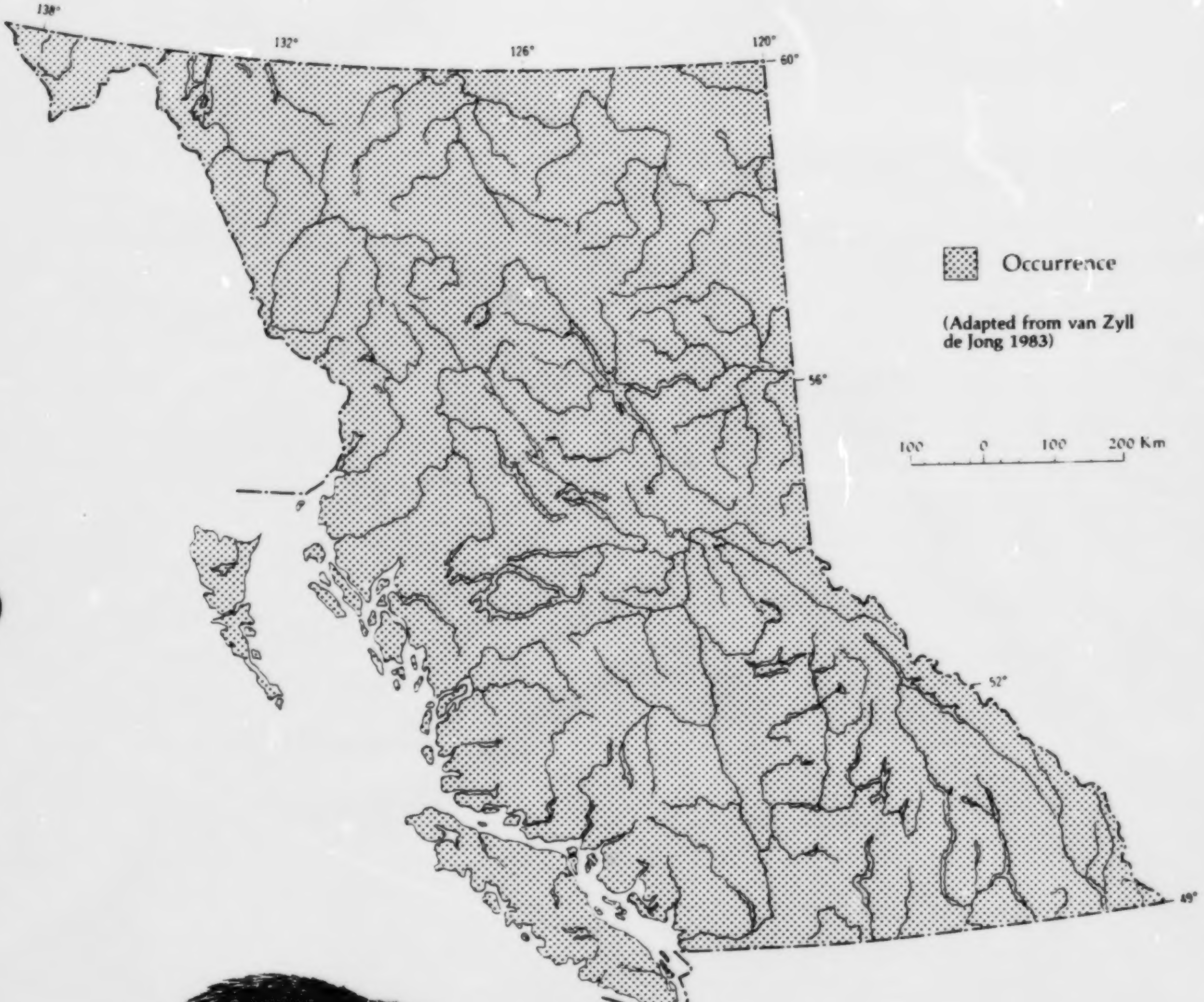
Status

Not in jeopardy. Not protected.

Selected References

Banfield 1974; Dalquest 1948; Hawes 1975, 1977; Ingles 1960, 1965; van Zyll de Jong 1983; Whitaker and Maser 1976.

Dusky Shrew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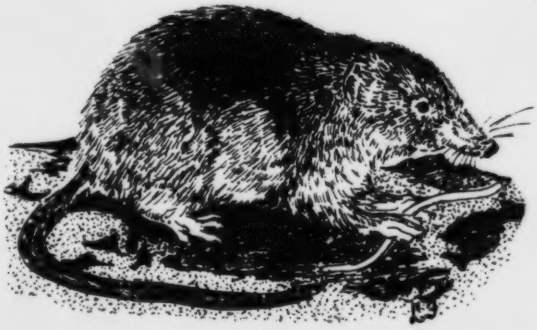


Water Shrew
SOPA
Sorex palustris Richardson
[American Water Shrew, Navigator Shrew]

Distribution, Seasonality and Abundance

Distributed throughout the province except the Queen Charlottes, near bodies of water. Abundance in British Columbia is unknown. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Habitat class is not as important as proximity to bodies of water such as streams, lakes, ponds, and wetland habitats. Usually found in conifer-dominated habitats.

SPECIFIC HABITAT ELEMENTS: Breeding season occurs from January to July. Nest under cover of rocks, logs, tree roots, or herbaceous layer, near water.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage along streambanks, water edges, and in water, along the bottoms of streams, etc. May swim under ice in winter.

SPECIFIC HABITAT ELEMENTS: Feed on larvae, insects, tadpoles, small fish, and other small vertebrates.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require escape cover such as a dense herbaceous layer or rocks and logs along streambanks.

Territory/Home Range

Not territorial in captivity. Home range small and closely associated with a stream or wet area.

Activity and Movement Patterns

Active periodically day and night, all year.

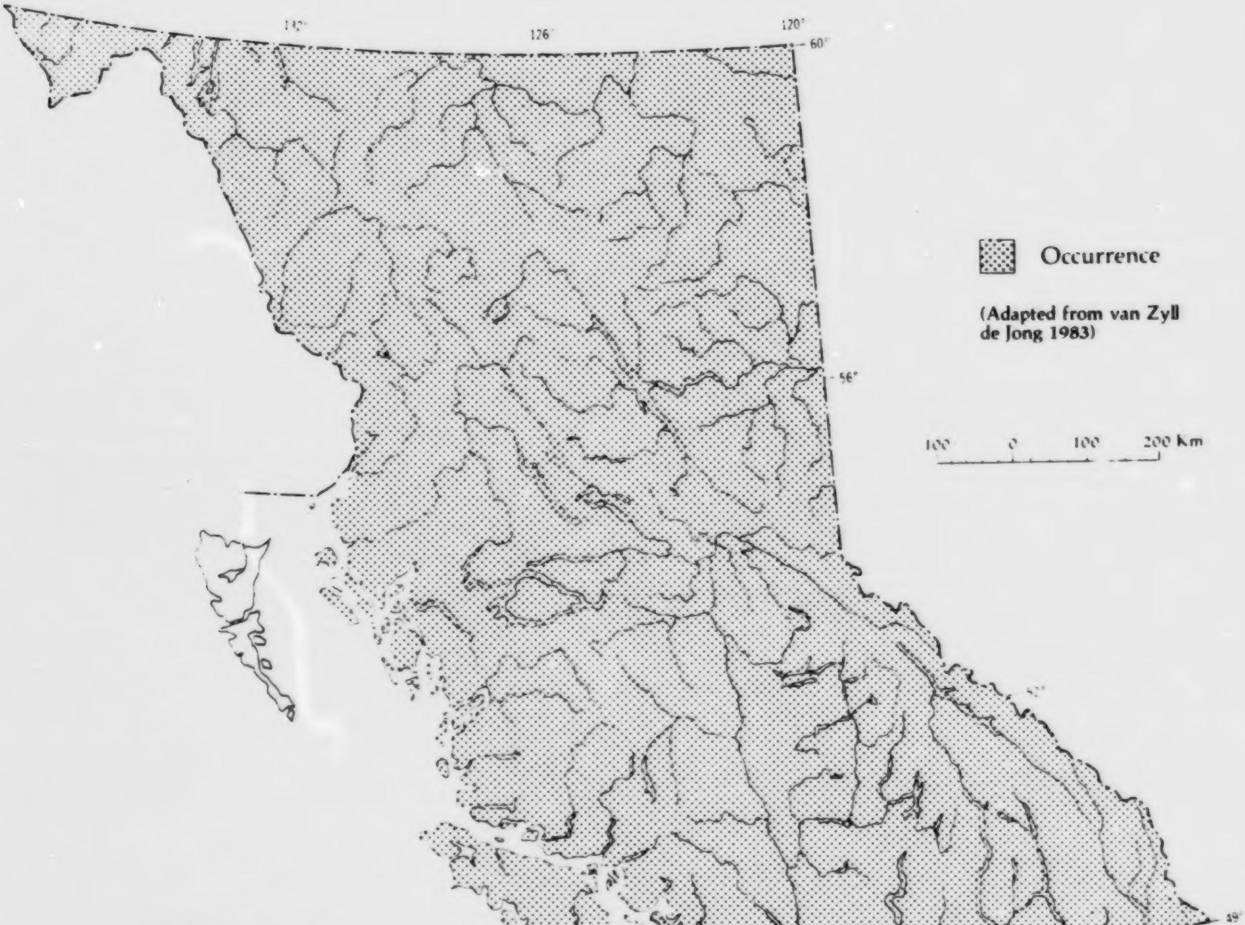
Status

Not in jeopardy. Not protected.

Selected References

Conaway 1952; Ingles 1965; Kritzman 1977; Sorenson 1962; van Zyll de Jong 1983.

Water Shrew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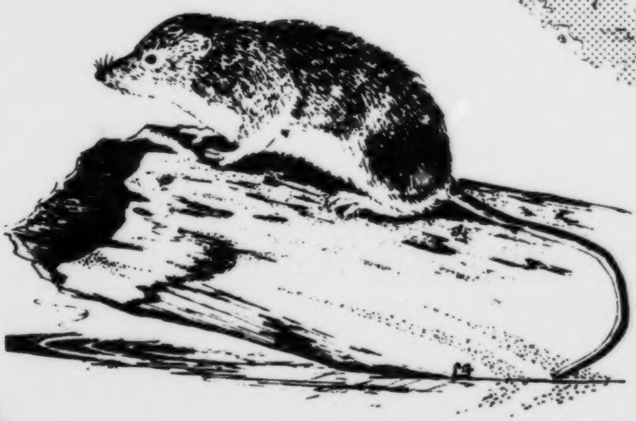


Little Brown Myotis
MYLU
Myotis lucifugus (LeConte)
[Little Brown Bat]

Distribution, Seasonality and Abundance

Distributed in forested habitats throughout the province including the Queen Charlottes and Vancouver Island. Range extends farther north than any other bat species in North America. Some evidence of hibernation in British Columbia. Abundant.

Habitat Requirements - Reproduction

HABITAT CLASSES: Widespread in habitats with trees and water.

SPECIFIC HABITAT ELEMENTS: These bats have so completely adapted to man-made structures such as attics or under eaves that there are few records of maternity roosts in natural habitats. Young are born in July in nursery colonies, which may have several hundred females and young. Usually these colonies are warm, dark, secluded, and near water.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage over water, agricultural habitats, urban/suburban habitats, and forested habitats. Absent above timberline.

SPECIFIC HABITAT ELEMENTS: Insectivorous. Primarily feed on aquatic flies but also eat beetles, ants, craneflies, crickets, and leafhoppers. Require an open water source and may concentrate at pools and streams to drink at dusk. Forage while flying over water and semi-open areas such as rocky hillsides, tree-lined streets, lawns, fields, and forest edges. Capture insects in their wings, except for very small ones, which are captured directly in the mouth.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Daytime roosts are essential for protection from predation and extremes in weather, and also for grooming, mating, resting, and nursing. These roosts may be in the roof or walls of old buildings, in sandstone cliffs and outcroppings and in tree cavities, snags, or under loose bark. Night roosting offers protection during cool periods and times of insect scarcity. Night roosts are small cavities where several individuals form tight clusters. Populations are probably limited by roost site availability rather than food. Little Brown Myotis usually hibernate in caves or abandoned mines. These locations are characterized by high humidity and above freezing temperatures. Disturbances during hibernation, including banding operations, cause these bats to lose weight and drastically reduce their chance of winter survival.

Sociality/Site Attachment

Maternity sites may be reused year after year.

Activity and Movement Patterns

May be active from dusk to dawn. Hibernate during the winter in clusters. Females may move several hundred kilometres between summer roosts and hibernation sites. Summer colonies in British Columbia known to be abandoned from October to May but not known where they go (Cowan 1942).

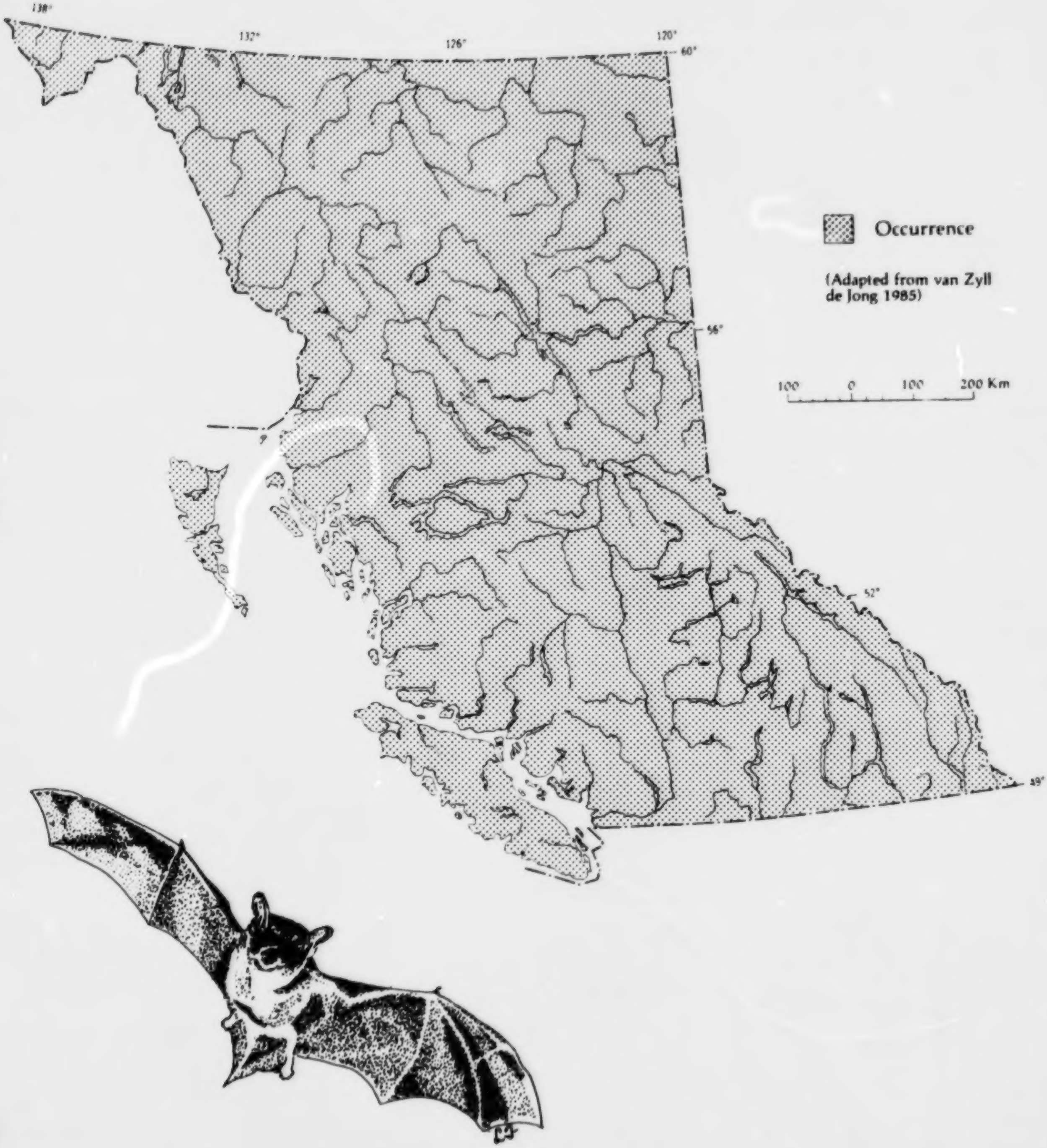
Status

Not in jeopardy. Not protected.

Selected References

Barbour and Davis 1969; Fenton and Barclay 1980; Maser *et al.* 1981; Schowalter *et al.* 1979; van Zyll de Jong 1985.

Little Brown Myotis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(Adapted from van Zyll de Jong 1985)

Yuma Myotis
MYYU
Myotis yumanensis (H. Allen)
[Yuma Bat]

Distribution, Seasonality and Abundance

Distributed throughout Vancouver Island, the southern half of the coast and the southern arid region of the province. It may hibernate in British Columbia.

Habitat Requirements - Reproduction

HABITAT CLASSES: Widespread in treed and open areas near water.

SPECIFIC HABITAT ELEMENTS: Maternity roosts are now almost entirely in man-made structures, although also found occasionally in caves, mines, or crevices. Will tolerate temperatures as high as 41C.

Habitat Requirements - Feeding

HABITAT CLASSES: Open coniferous forest near water.

SPECIFIC HABITAT ELEMENTS: Insectivorous. Populations in the Okanagan were found to eat mainly caddisflies and mayflies. In western Oregon, the main prey species are flies, termites, and moths. Forage over still or flowing water but can also be found over the coastal shoreline and meadows. Generally forage 30-150 cm off the water.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require night and day roosting areas as well as hibernation sites. These are often spaces in the roof of old barns and houses or in attics of houses.

Sociality/Site Attachment

These bats use a repetitive flight path (often circular) when foraging. Some individuals use the same area every night (Woodsworth 1981). Sometimes form large colonies.

Activity and Movement Patterns

Nocturnal with feeding occurring in the early evening. These bats disappear from British Columbia in late October but it is not known where they go. Arrive back in April.

Status

Indeterminate. Not protected.

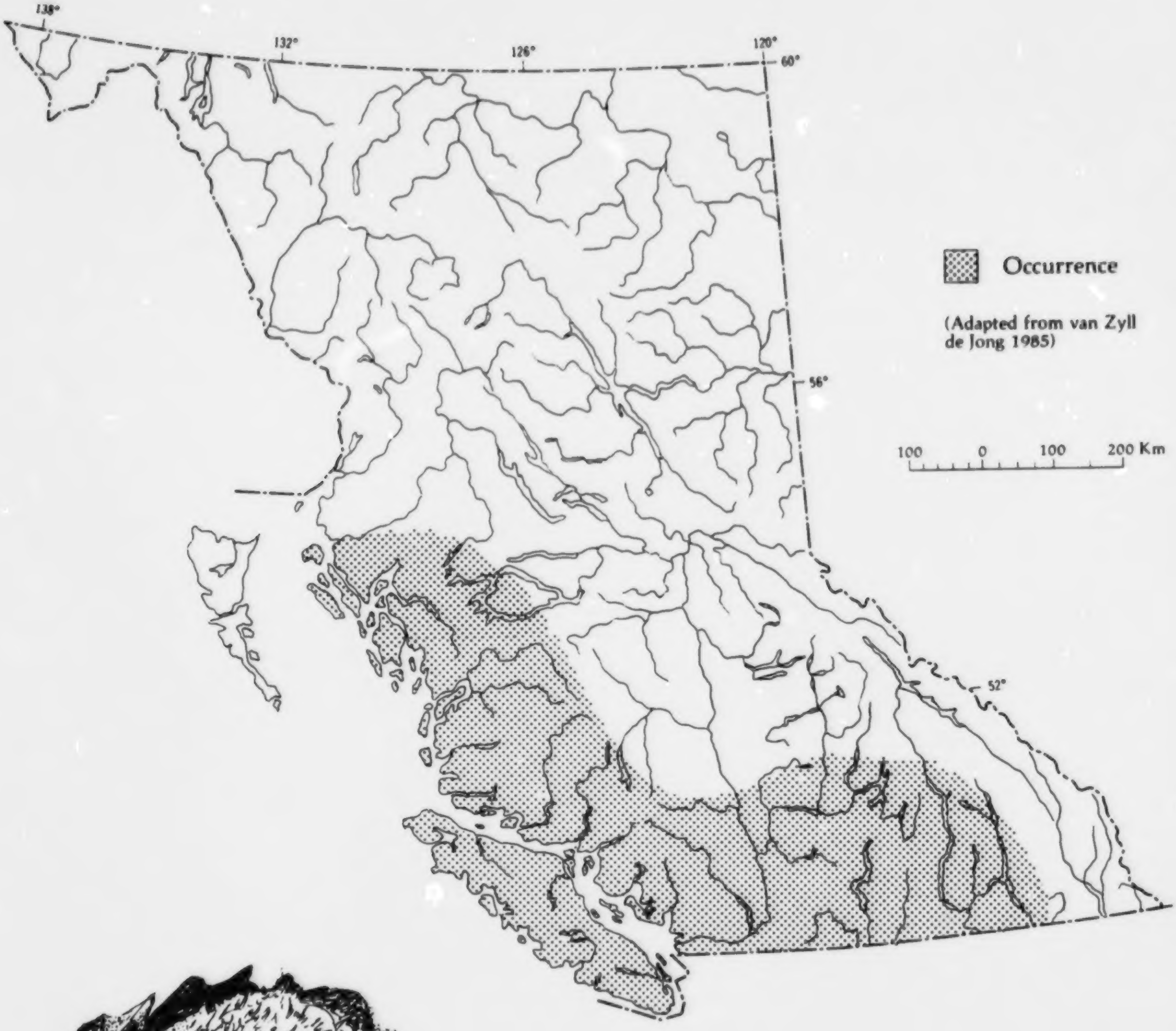
Other

Roosting sites may be shared with Little Brown Myotis, Long-eared Myotis, or California Myotis. Competition with the ecologically similar Little Brown Myotis is tempered by differences in foraging areas. Yuma Myotis prefers foraging over flowing water while the Little Brown Myotis chooses to forage over still water, among trees, or near bluffs.

Selected References

Barbour and Davis 1969; Herd and Fenton 1983; Maser *et al.* 1981; van Zyll de Jong 1985.

Yuma Myotis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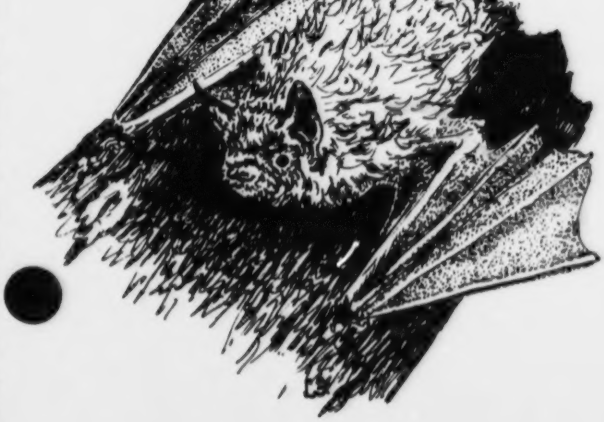


Long-eared Myotis
MYEV
Myotis evotis (H. Allen)
[Long-eared Bat]

Distribution, Seasonality and Abundance

Distributed along the southern coastal area and Vancouver Island and occurs sporadically through central and southern portions of the province. Abundance in British Columbia is not known. Believed to be a summer resident only.

Habitat Requirements - Reproduction

HABITAT CLASSES: Use a variety of habitats including coastal forests such as western hemlock - Douglas-fir forests and coniferous forests of the interior such as Douglas-fir - ponderosa pine forests and Engelmann spruce - subalpine fir forests.

SPECIFIC HABITAT ELEMENTS: Young are born in late July in small maternity colonies. These colonies have been found in rock crevices, buildings, snags, and hollow trees.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements.

SPECIFIC HABITAT ELEMENTS: Insectivorous. Feed on a variety of species including flies, moths, beetles, and spiders. Require access to water and concentrate at pools and mountain streams to drink at dusk. Forage late in the evening among trees and over water. On the coast, usually associated with broken rock outcroppings.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require day roosts. These may be found in buildings or behind loose bark on snags. At night, they may roost in caves. Have been found hibernating in caves, but nothing known about British Columbia.

Activity and Movement Patterns

Nocturnal, feed in the late evening after full darkness. Probably migratory.

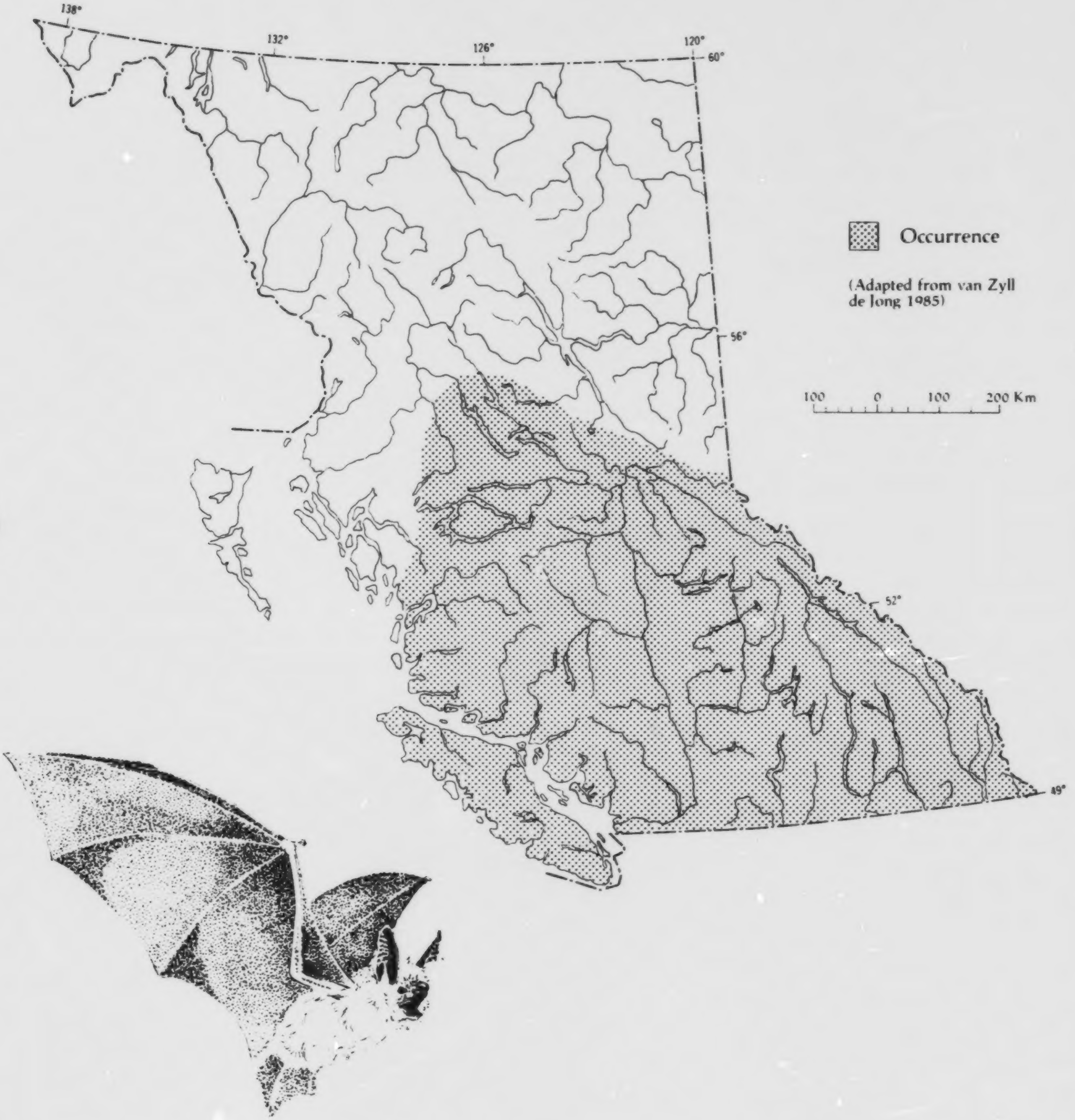
Status

Not in jeopardy. Not protected.

Selected References

Barbour and Davis 1969; Maser *et al.* 1981; van Zyll de Jong 1979, 1985.

Long-eared Myotis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(Adapted from van Zyll de Jong 1985)

Fringed Myotis
MYTH
Myotis thysanodes Miller
[Fringed Bat]

Distribution, Seasonality and Abundance

In Canada known only from the Okanagan Valley. Has been found in Vernon, Oliver, and Osoyoos. Distribution in winter is unknown. Abundance in British Columbia is unknown.

Habitat Requirements - Reproduction

HABITAT CLASSES: Open sagebrush steppe and dry ponderosa pine forest.

SPECIFIC HABITAT ELEMENTS: In Oregon, breeding occurs in September/October and the young are born in late June/early July. Maternity colonies of up to 200 individuals roost in dry, warm external sites such as houses, barns, caves, mines, and rock crevices.

Habitat Requirements - Feeding

HABITAT CLASSES: Occurs in arid habitats such as ponderosa pine parkland, Douglas-fir - ponderosa pine forest, and sagebrush steppe.

SPECIFIC HABITAT ELEMENTS: Insectivorous. These bats have been described as hovering gleaners, feeding primarily on beetles and moths but they also eat daddy longlegs, crickets, craneflies, and spiders. May forage in low dry shrublands associations but usually forage close to forested or riparian areas.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require day and night roosts, usually in caves, mine tunnels, rock crevices, or buildings. Maternity colonies of 30-40 may roost in attics.

Activity and Movement Patterns

Most of their activity occurs from 1 to 2 hours after sunset. May hibernate for 6 months or more. Probably migrate to areas where they may be periodically active during the winter. Juvenile males leave maternity roosts before juvenile females.

Status

Indeterminate. Not currently protected, but getting special attention from Wildlife Branch.

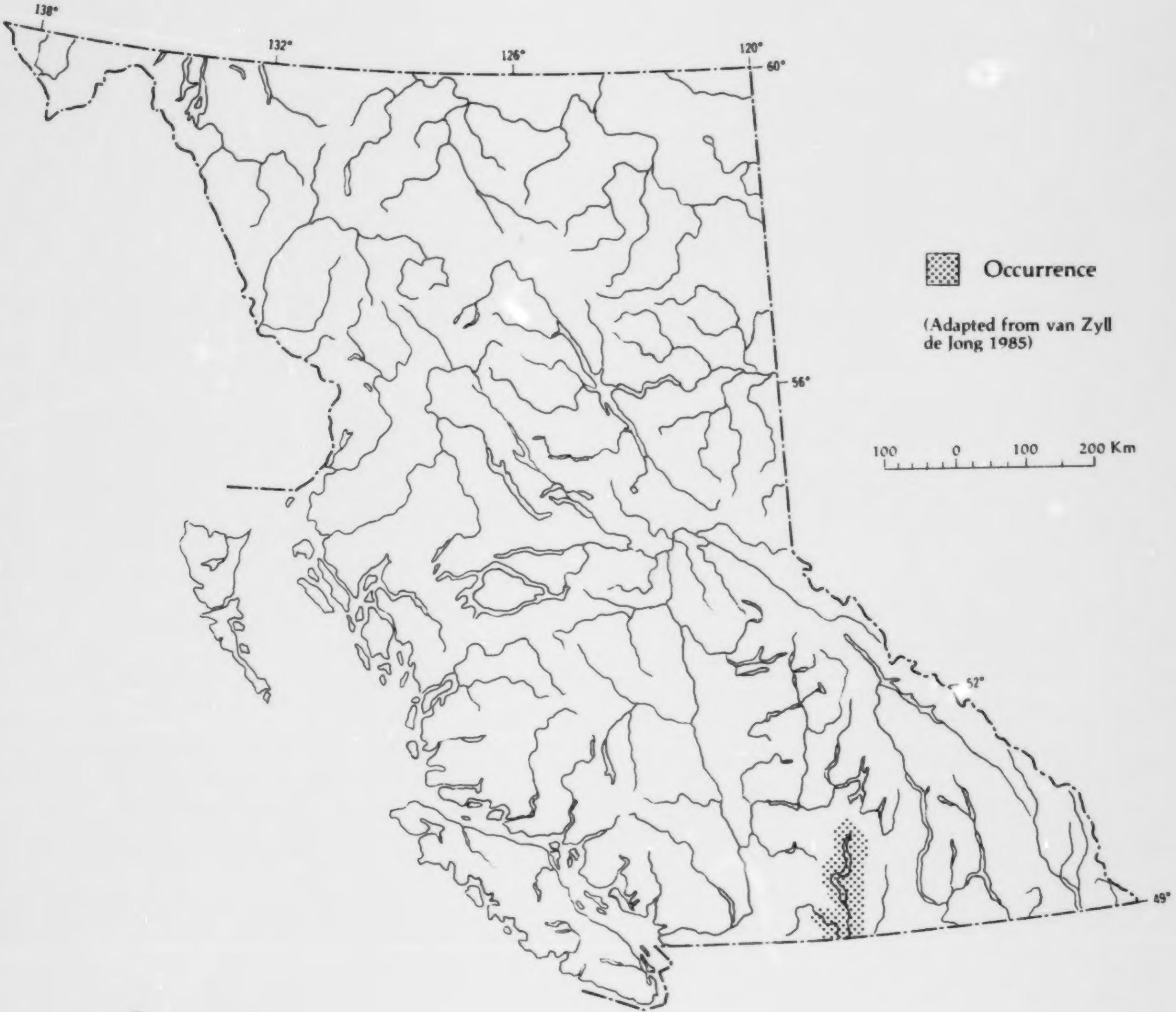
Other

Fringed Myotis is consistently found in association with many other bat species.

Selected References

Barbour and Davis 1969; Kunz 1982b; Maser *et al.* 1981; O'Farrell and Studier 1980; van Zyll de Jong 1985.

Fringed Myotis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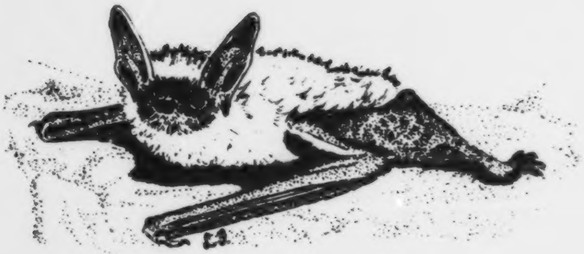


Long-legged Myotis
MYVO
Myotis volans (H. Allen)
[Long-legged Bat]

Distribution, Seasonality and Abundance

Found in forested montane habitats throughout the province with the exception of the northeast quadrant and the Queen Charlottes. Native yearlong resident. Uncommon.

Habitat Requirements - Reproduction

HABITAT CLASSES: Coniferous forests, usually in mountainous regions.

SPECIFIC HABITAT ELEMENTS: Maternity colonies most often found in trees under exfoliating bark, but may also be in rock crevices, cracks in stream banks, or buildings.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage over, under, and through coniferous forest canopy.

SPECIFIC HABITAT ELEMENTS: Insectivorous. Eat mainly small moths, but also eat beetles and other soft-bodied insects caught on the wing. Respond to artificial patches of prey such as swarms attracted to lights.

Habitat Requirement - Special Needs

SPECIFIC HABITAT ELEMENTS: Day roosts are in abandoned buildings, cracks in the ground, crevices in cliff faces, or beneath bark on a tree. Hibernacula are in caves and mines.

Sociality/Site Attachment

Moderately gregarious in maternity colonies, during hibernation, or when swarming.

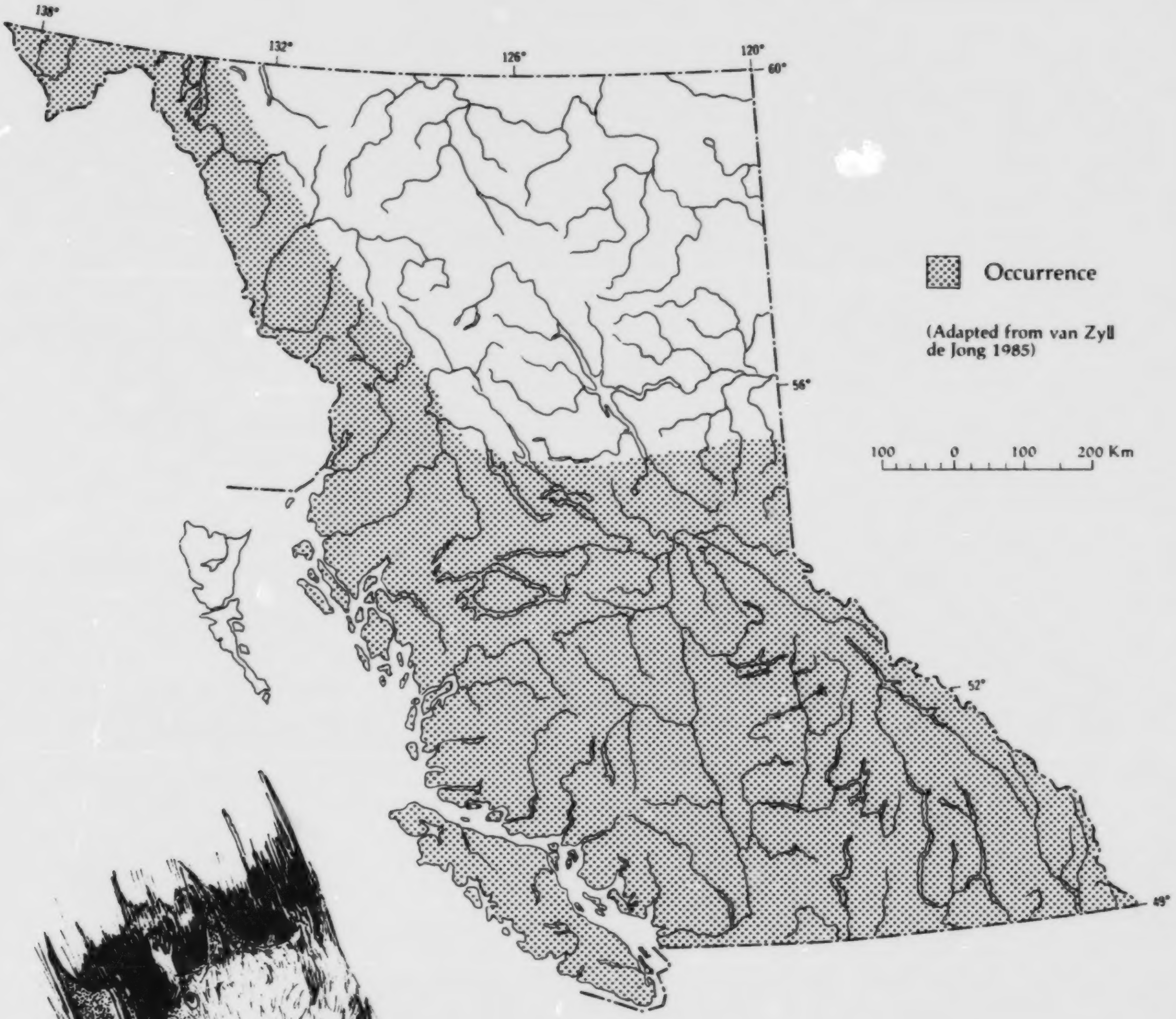
Status

Probably not in jeopardy. Rare but widely distributed. Not protected.

Selected References

Warner and Czaplewski 1984; van Zyll de Jong 1985.

Long-legged Myotis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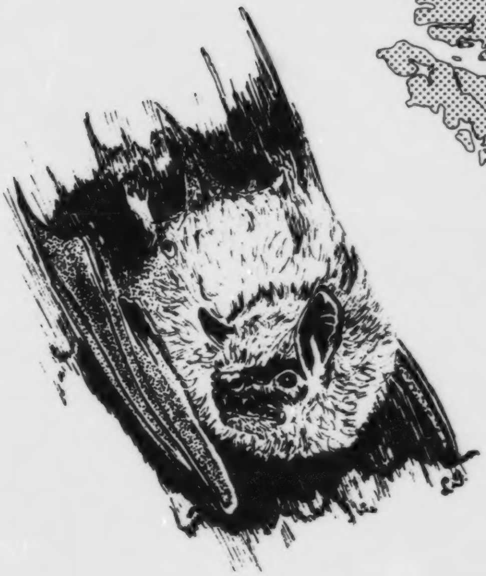


California Myotis
MYCA
Myotis californicus
(Audubon and Bachman)
[California Bat]

Distribution, Seasonality and Abundance

In Canada known only from British Columbia. Distributed throughout the Queen Charlottes, Vancouver Island, and southern coastal area. Also occurs in the Okanagan, North Thompson valleys, and Kootenays. Common. Native yearlong resident, although some populations may migrate south in the winter.

Habitat Requirements - Reproduction

HABITAT CLASSES: Wide range of habitat tolerance from coastal forest to arid semi-desert.

SPECIFIC HABITAT ELEMENTS: Breed in the fall and winter. Young are born in July. Small nursery colonies are found in rock crevices, snags, and under loose bark or eaves of buildings.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in a variety of habitats from dense conifer - dominated forests such as western hemlock - Douglas-fir forests to open forests such as ponderosa pine parkland and Douglas-fir - ponderosa pine forests and over various aquatic habitats.

SPECIFIC HABITAT ELEMENTS: Insectivorous. In the Okanagan, feed on caddisflies, beetles, flies, and moths. Forage at night over water and close to the margins of streams, rivers, and lakes. Also forage in parklands and openings in dense forests. Watering places are usually visited several times during the night.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require day roosts, which are usually crevice-like places such as hollow trees, behind loose bark, or under buildings. Night roosts are in buildings, caves, mines, or vegetation with the following characteristics: dark, sheltered from the wind, and near a foraging area. Hibernation sites are probably similar to night roosts.

Sociality/Site Attachment

Found singly or in small colonies. Transient and rarely use the same day roost for more than two days.

Activity and Movement Patterns

Nocturnal. Activity during the winter at temperatures of -8C has been recorded. At temperatures below 15C, feeding patterns change with bats feeding 4-5 hours rather than all night. These bats are known to feed occasionally during the day. British Columbia populations probably hibernate or migrate south, but in California, have been found active during every month. Some evidence that this species winters in southeastern British Columbia (Cowan 1942).

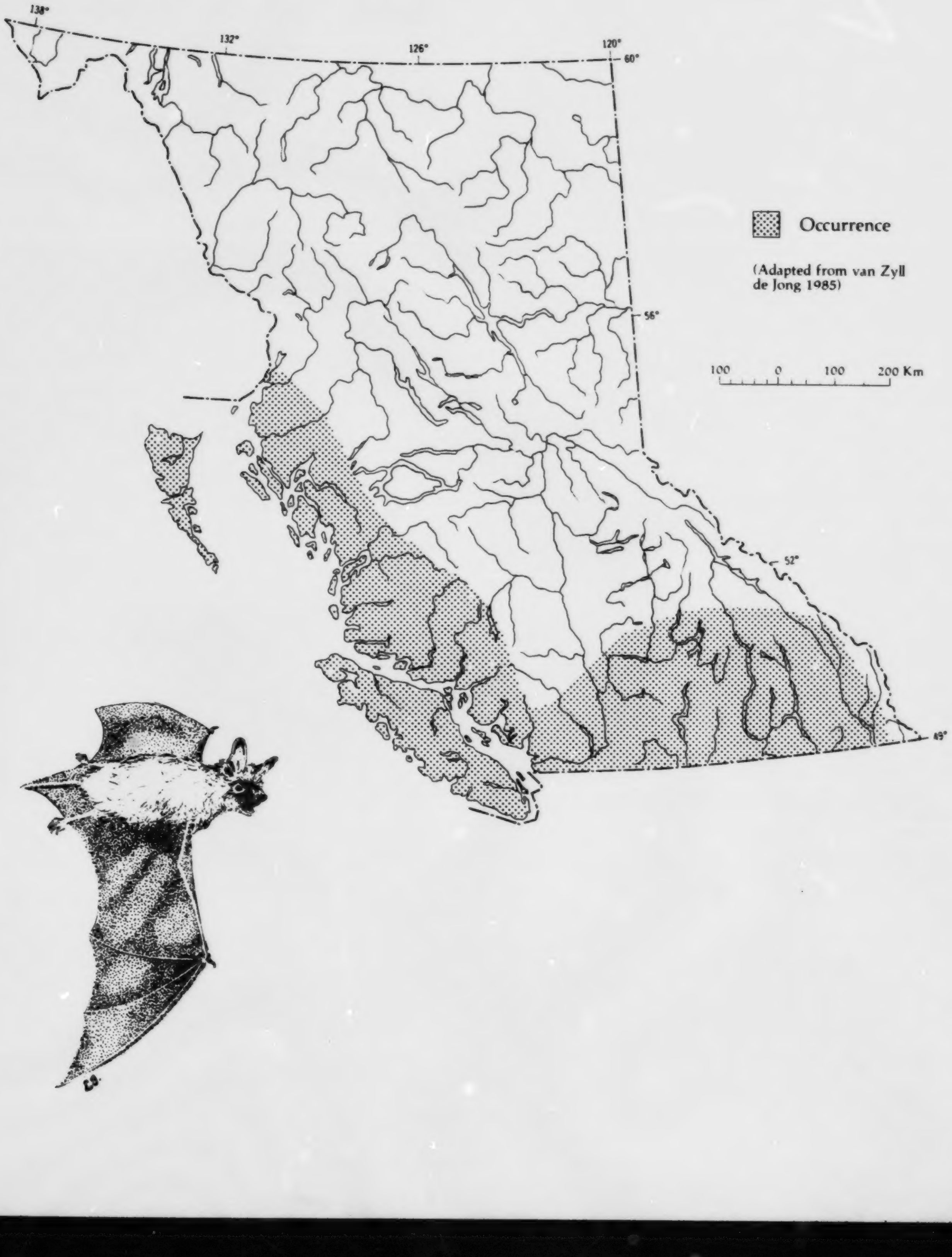
Status

Indeterminate. Not protected.

Selected References

Barbour and Davis 1969; Krutzech 1954; Maser *et al.* 1981; van Zyll de Jong 1985; Woodsworth 1981.

California Myotis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(Adapted from van Zyll de Jong 1985)

Western Small-footed Myotis
MYLE
Myotis ciliolabrum (M. leibii)
(Audubon and Bachman)
[Small-footed Bat, Small-footed Myotis]

Distribution, Seasonality and Abundance

In British Columbia, known only from Vaseux Lake, Oyama, Keremeos, and Osoyoos Lake in the most arid part of the Okanagan and Similkameen Valleys. Abundance is not known.

Habitat Requirements - Reproduction

HABITAT CLASSES: Arid habitats such as sagebrush steppe and ponderosa pine parkland, in association with cliffs and talus.

SPECIFIC HABITAT ELEMENTS: Maternity roosts are found in crevices or under rocks where the temperature is higher than in caves. Small maternity colonies have been found in buildings.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements.

SPECIFIC HABITAT ELEMENTS: Insectivorous. In the Okanagan, their diet consists of caddisflies, beetles, flies, and moths taken in flight. Forage above or adjacent to rocky hillsides and bluffs but generally not over water.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Roost singly or in colonies. Day roosts are small, dry, shallow areas in rock crevices and between boulders in talus. Night roosts are in buildings and caves. There are no hibernation data from Canada, but elsewhere they hibernate in caves and mines.

Sociality/Site Attachment

Individual bats follow particular foraging routes every night (Woodsworth 1981).

Activity and Movement Patterns

Small-footed Myotis are nocturnal and hibernate during the winter.

Status

Indeterminate. Not protected.

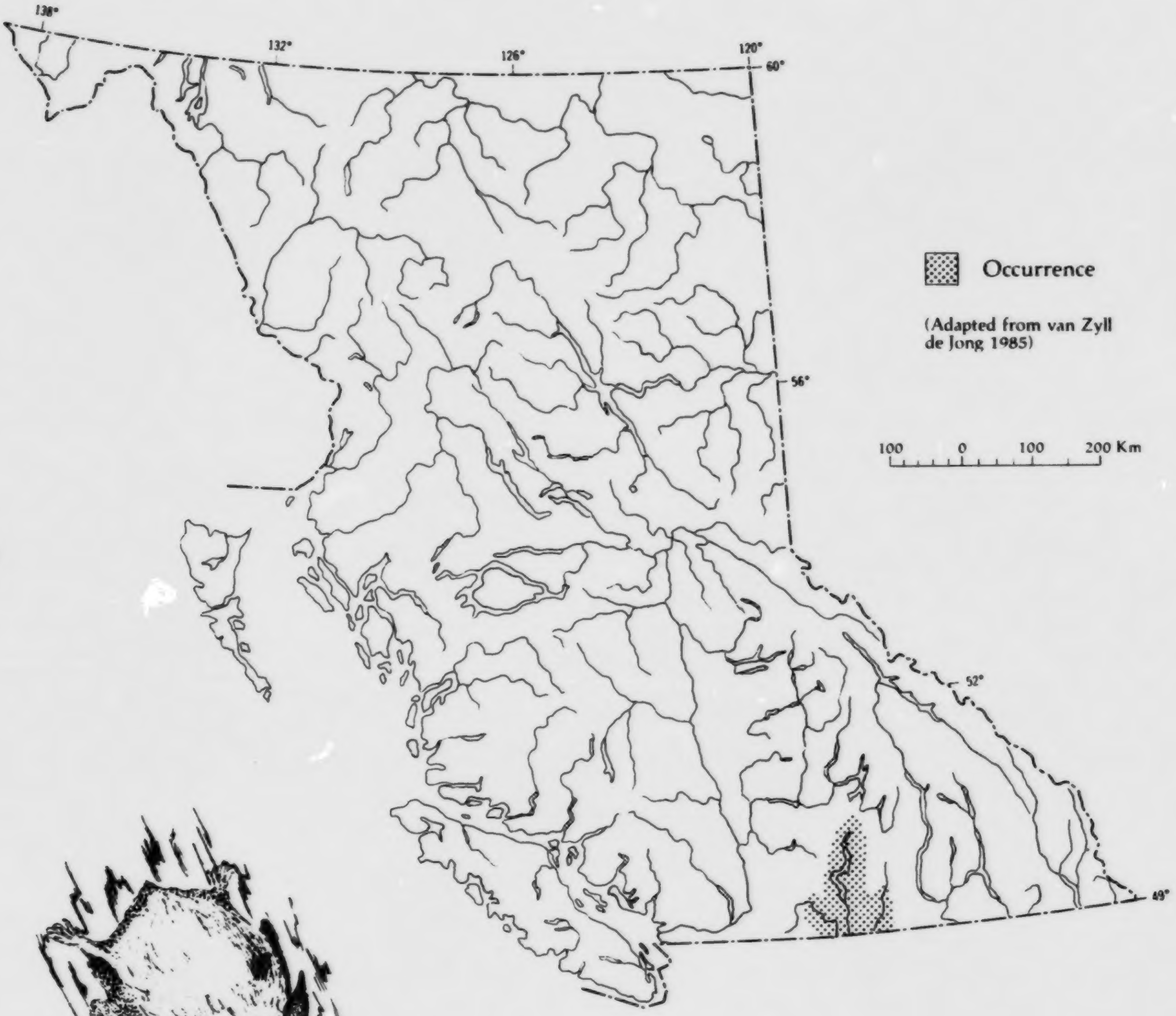
Other

Very similar to California Myotis. May coexist by means of spatial partitioning. California Myotis forages near water, but not Western Small-footed Myotis.

Selected References

Barbour and Davis 1969; van Zyll de Jong 1985; Woodsworth 1981.

Western
Small-footed Myotis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(Adapted from van Zyll de Jong 1985)

Silver-haired Bat
LANO
Lasionycteris noctivagans
(LeConte)

Distribution, Seasonality and Abundance

Distributed in forested areas in the southern half of the province, north to Charlie Lake, from sea level to 500 m. Generally accepted as a migratory species over most of its range; evidence from the coast of southwestern British Columbia, however, shows this bat to be resident all year. Abundance in the province is unknown.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats, preferably near water.

SPECIFIC HABITAT ELEMENTS: Breeding occurs from September to October and young are born in late June or early July. Nursery colonies have been found in trees, snags, an abandoned crow's nest, and piles of lumber.

Habitat Requirements - Feeding

HABITAT CLASSES: Forages in conifer-dominated or mixed forest habitats adjacent to or over bodies of water.

SPECIFIC HABITAT ELEMENTS: Insectivorous. In Oregon, the main food item was moths, but flies, true bugs, bees, ants, beetles, crickets, and caddisflies were also eaten (Maser *et al.* 1981). These bats are slow flyers and forage 7-13 m above the ground.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require day roosts, which are usually found underneath loose bark of trees, in woodpecker holes, bird's nests or in any open, man-made shelter. Hibernate under tree bark, and in tree cavities, buildings, rock crevices, or other protected sites.

Sociality/Site Attachment

Usually a solitary species. Some evidence of attachment to a home range, returning to the same area year after year.

Activity and Movement Patterns

Nocturnal, emerging to feed about 15-45 minutes before dark. The annual cycle may or may not include seasonal migration, depending on the climate. Some evidence that this bat hibernates in southwestern British Columbia. It has been hypothesized that in some areas, migration may be altitudinal rather than latitudinal (Schowalter *et al.* 1978).

Status

Probably not in jeopardy. Not protected.

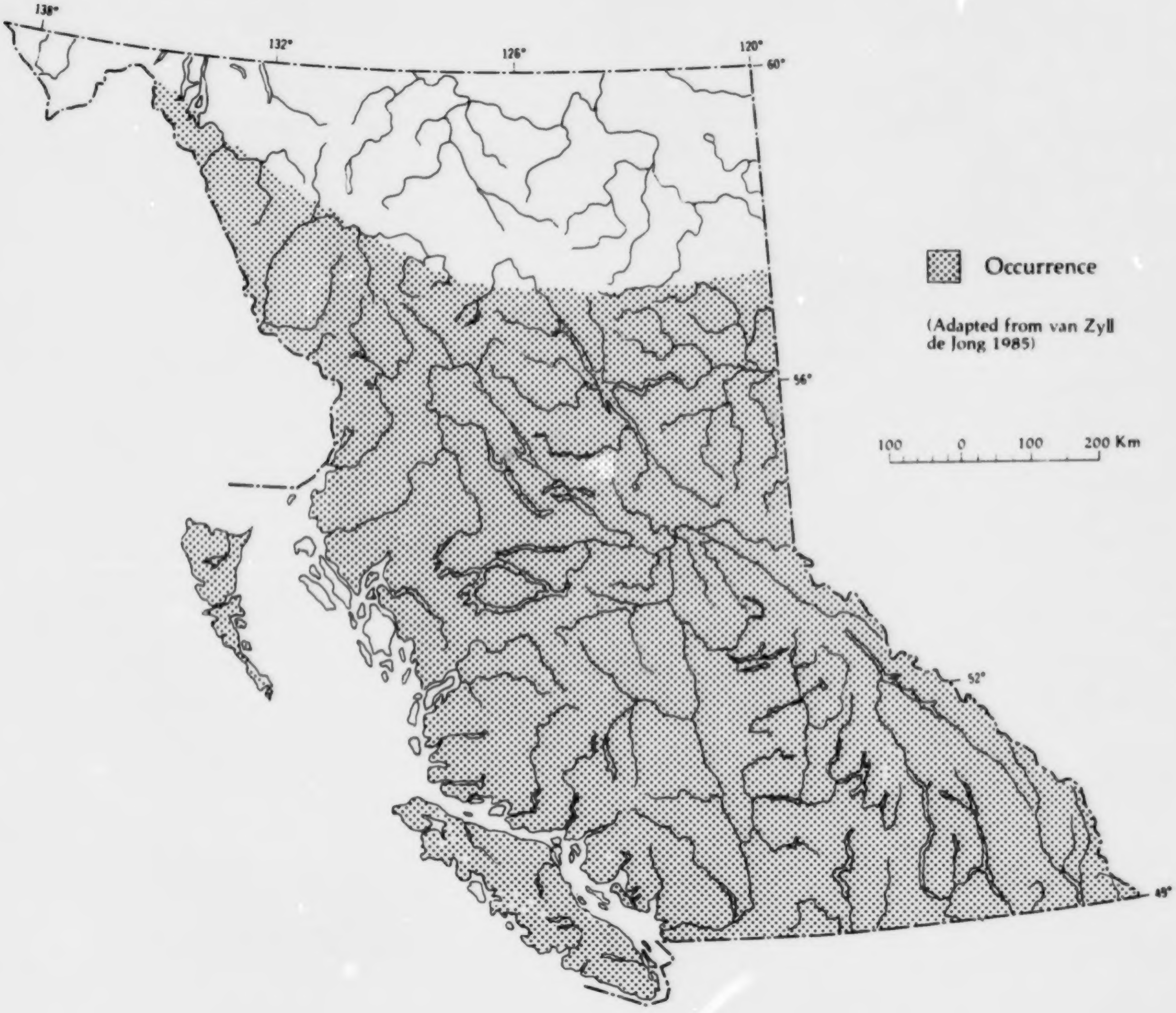
Other

The presence of Big Brown Bats may reduce the foraging efficiency of Silver-haired Bats by delaying their peak of feeding. However, Silver-haired Bats may forage alongside several other bat species.

Selected References

Barbour and Davis 1969; Kunz 1982a; Maser *et al.* 1981; Schowalter *et al.* 1978; van Zyll de Jong 1985; Whitaker *et al.* 1979.

Silver-haired Bat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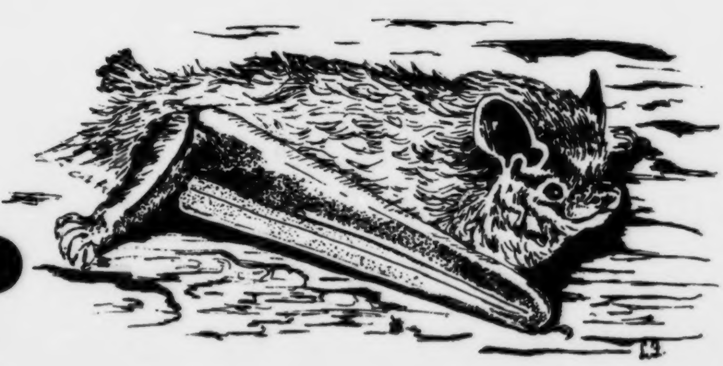


Big Brown Bat
EPFU
Eptesicus fuscus (Beauvois)

Distribution, Seasonality and Abundance

Distributed through the Puget Sound lowlands as far north as Stuie on the coast, southern Vancouver Island, south central interior and Peace River parklands. Native yearlong resident. Abundance in British Columbia is not known.

Habitat Requirements - Reproduction

HABITAT CLASSES: Utilize forested habitats and man-influenced habitats.

SPECIFIC HABITAT ELEMENTS: Breeding occurs just prior to or during hibernation. Young are born in July and nursery colonies are formed by females during the summer. These are found in such places as buildings, beneath bridges, crevices, snags, and hollow trees.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage primarily in forested habitats but also utilize man-influenced habitats.

SPECIFIC HABITAT ELEMENTS: Insectivorous. Main food items are beetles. Forage at night over forest canopies, along roads, forest edges, clearings, cliffs, and waterways. Also commonly observed in cities and towns. Night roosts are used to eat larger prey.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Hibernation sites are dry and cool. They may be within caves, buildings, mines, tunnels, quarries, storm sewers, or similar shelter. At this time bats are very sensitive to disturbance. Males are often in colder areas than females and may form large clusters to conserve heat. During active times of year, roosts are used in daylight hours. These may be any number of dark places such as porches, garages, and hollow trees. Males roost alone in summer, but females return to nursery colonies that may have as many as 200 bats. Roosts are always close to water. These bats are intolerant of high temperatures and will leave a roost if the temperature rises above 35C. Night roosts are often in open, man-made structures.

Activity and Movement Patterns

Emerge from day roosts around sunset and feed heavily for about 2 hours. A limited amount of foraging may occur during the rest of the night. Hibernacula probably located near summer ranges. These bats hibernate and winter activity occurs only if they are disturbed or if the temperature inside the hibernation site drops below 0C.

Status

Not in jeopardy. Not protected.

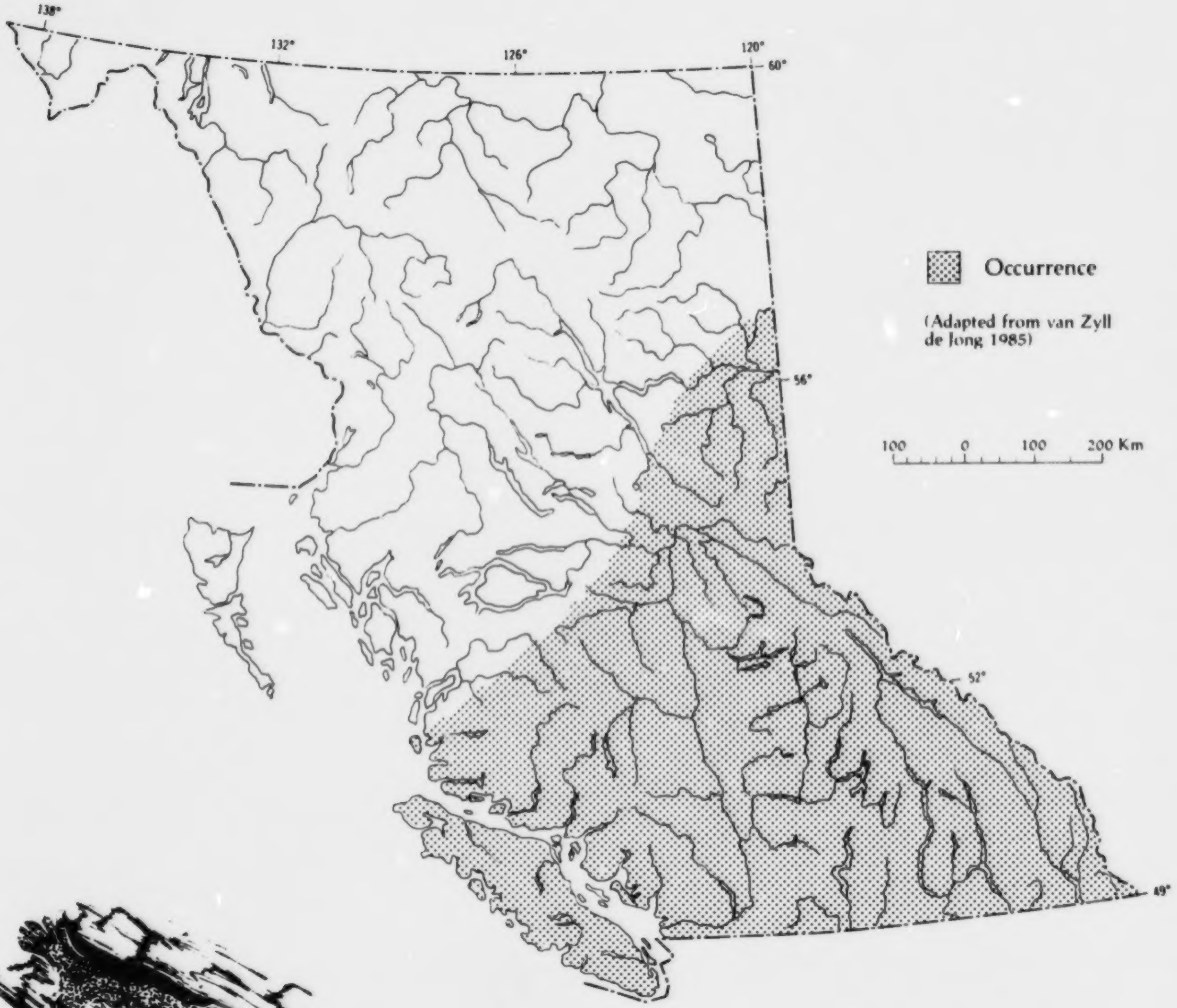
Other

May be found in the same roosts as Pallid Bats or Yuma Myotis. Especially sensitive to insecticides such as DDT. Large scale use of these chemicals causes high mortality in Big Brown Bat colonies.

Selected References

Barbour and Davis 1969; Davis *et al.* 1968; Goehring 1972; Maser *et al.* 1981; van Zyll de Jong 1985.

Big Brown Bat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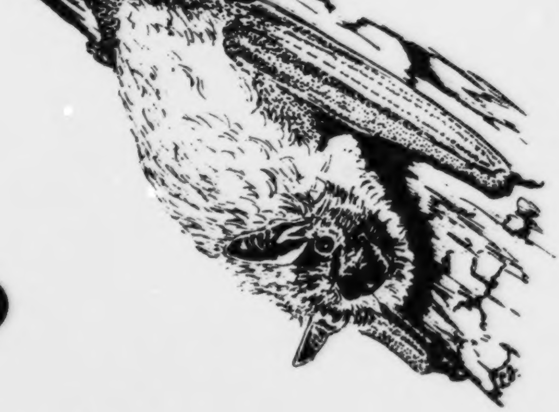


Hoary Bat
LACI
Lasiurus cinereus (Beauvois)

Distribution, Seasonality and Abundance

All provincial specimens have been taken from the extreme southern parts of the province: Alta Lake, Vancouver, Huntingdon, Victoria, northwestern Vancouver Island, and the Okanagan Valley. Migratory. Abundance in British Columbia is not known.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats and orchards.

SPECIFIC HABITAT ELEMENTS: Breed in late September to early November and young are born in late May to early July. Females with young roost in coniferous or deciduous trees, usually above 5 m.

Habitat Requirements - Feeding

HABITAT CLASSES: Forested and agricultural habitats. Forage high in the air above open areas such as fields, rivers, lakes, and forest clearings.

SPECIFIC HABITAT ELEMENTS: Primarily insectivorous. Hoary Bats seem to prefer moths but will also eat beetles, flies, grasshoppers, termites, and dragonflies. They have been observed skimming the surface of lakes for insects or foraging where lights concentrate flying insects.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: During the day, Hoary Bats roost alone in deciduous or coniferous trees, generally 3-5 m above the ground. They are cryptically coloured and blend in with the foliage. Roosts are commonly visible only from below, lack branches from which predators may attack, and are in places where sunlight will not reflect on the bat. Roosts are often found in orchard trees.

Activity and Movement Patterns

Hoary Bats are nocturnal, usually emerging from their roosts late in the evening, 1 to 4 hours after sunset. Migrate south in August but some populations may hibernate. Spring migration begins in April with bats reaching British Columbia during the summer. Migration appears to be segregated by sex with pregnant females migrating north earlier than males.

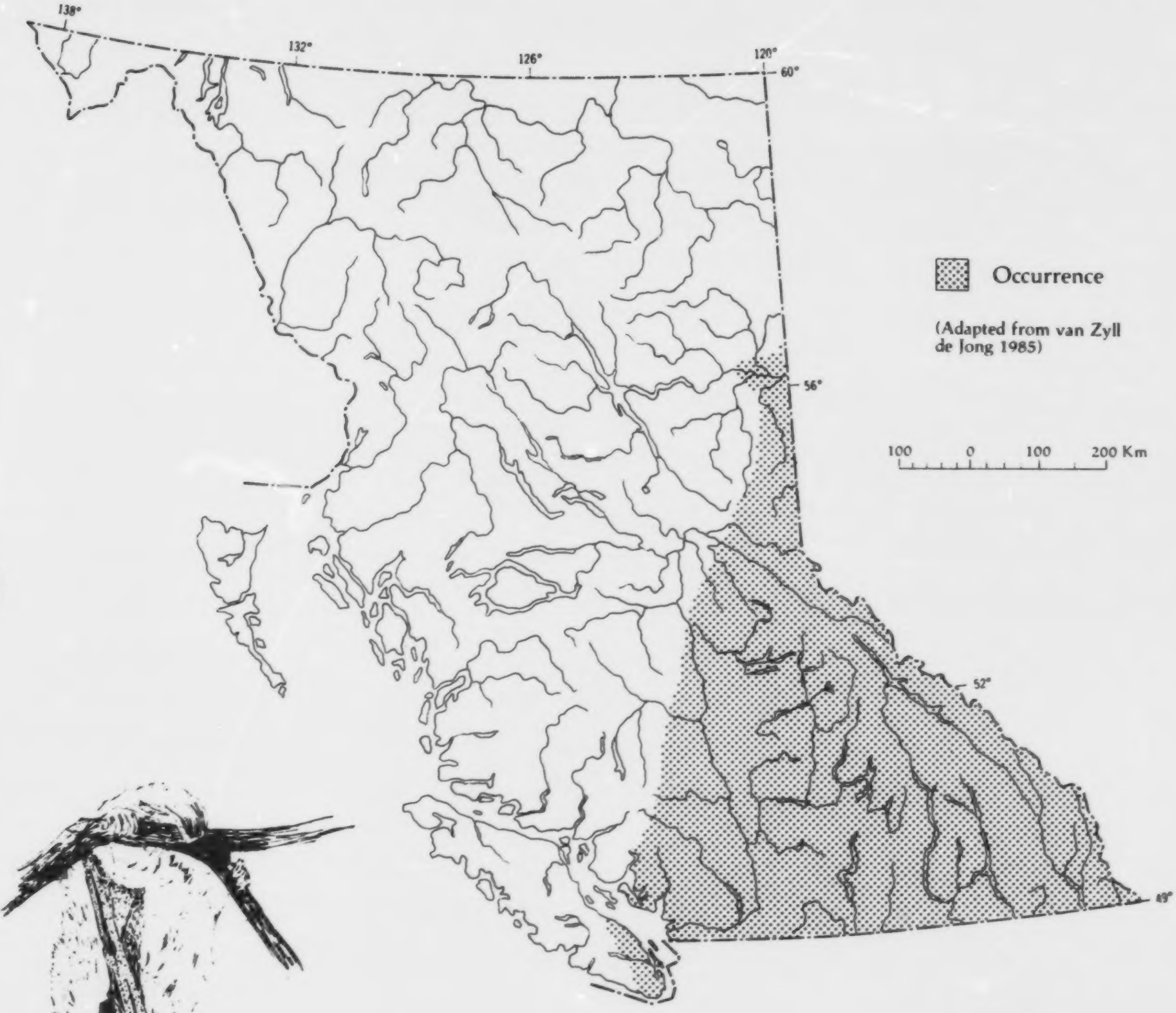
Status

Probably not in jeopardy. Not protected.

Selected References

Barbour and Davis 1969; Black 1974; Constantine 1966; Maser *et al.* 1981; Schump and Schump 1982; van Zyll de Jong 1985.

Hoary Bat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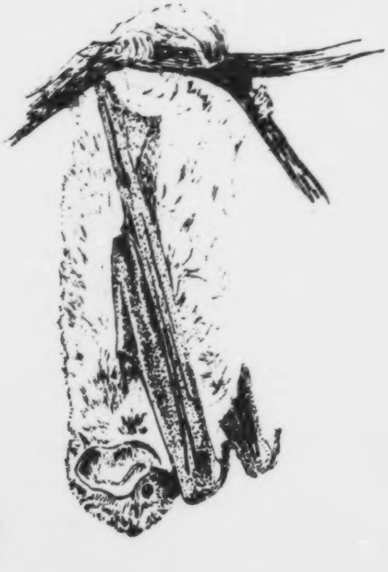


Spotted Bat
EUMA
Euderma maculatum (J.A. Allen)

Distribution, Seasonality and Abundance

In Canada, known only from British Columbia. Resident breeding populations in the Okanagan and Similkameen valleys. Not known if its range extends beyond these valleys or if it winters in the province.

Habitat Requirements - Reproduction

SPECIFIC HABITAT ELEMENTS: Young are born in late spring and summer. Requirements for maternity roost largely unknown but thought to be on cliff faces.

Habitat Requirements - Feeding

HABITAT CLASSES: Usually found in dry, rough terrain. Probably occur in Douglas-fir - ponderosa pine forest, ponderosa pine parkland, and sagebrush steppe in British Columbia.

SPECIFIC HABITAT ELEMENTS: Insectivorous. Main prey species are moths. Forage above fields and clearings surrounded by ponderosa pine. May use pine trees as temporary roosts while eating and digesting prey.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Need daytime roosts, which may be on steep cliffs with numerous ledges and crevices or under loose boulders. Require pools, ponds, or lakes for water.

Sociality/Site Attachment

Roost alone rather than in colonies. Spotted Bats practice mutual avoidance when feeding, but will readily expand the area used if neighbouring bats are absent.

Activity and Movement Patterns

Nocturnal with a peak foraging time from midnight to 0300 h. Have been observed at a maximum distance of 14 km from known roosts (Leonard 1982).

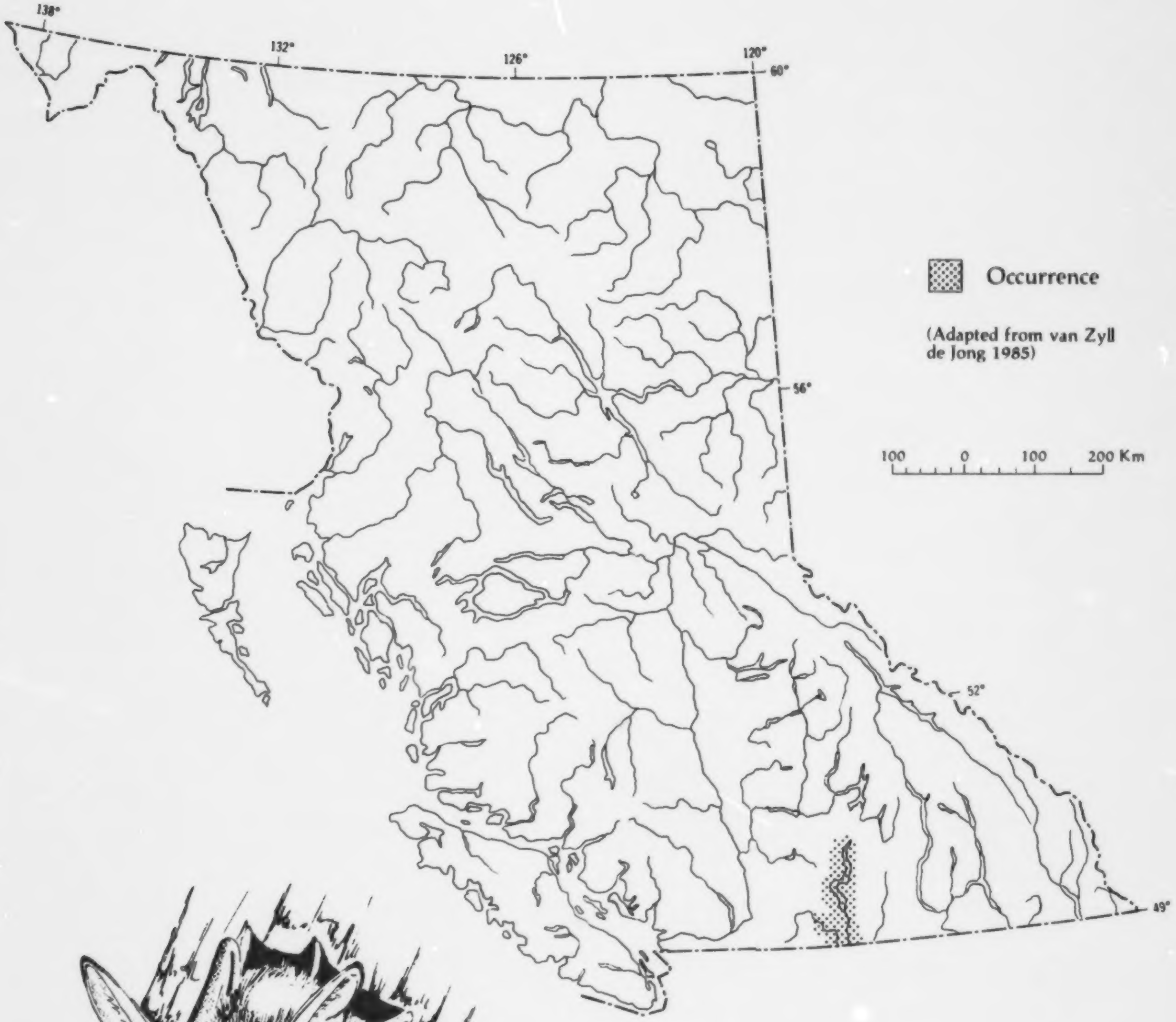
Status

Indeterminate. Protected as wildlife under the British Columbia Wildlife Act (1982).

Selected References

Barbour and Davis 1969; Leonard 1982; Leonard and Fenton 1983; van Zyll de Jong 1985; Watkins 1977.

Spotted Bat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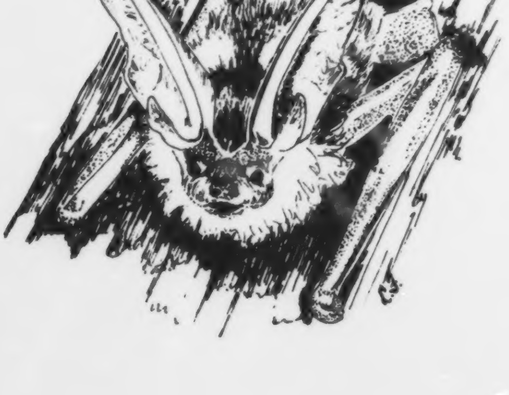


Pallid Bat
ANPA
Antrozous pallidus (Le Conte)

Distribution, Seasonality and Abundance

Their known distribution in Canada is limited to the southern Okanagan, where there is a resident breeding population. The current population is not known but it is probably small.

Habitat Requirements - Reproduction

HABITAT CLASSES: Sagebrush steppe.

SPECIFIC HABITAT ELEMENTS: Breed in October/ December and young are born in late May to mid-July. These bats have small maternity colonies of 12 to 100 individuals in rock crevices, caves, buildings, and other areas of semi- darkness.

Habitat Requirements - Feeding

HABITAT CLASSES: Sagebrush steppe near water and rocky outcroppings.

SPECIFIC HABITAT ELEMENTS: Primarily insectivorous gleaners. Prefer moths and beetles but may eat lizards and small bats. Forage close to the ground, often landing to catch ground-dwelling arthropods. May return to night roosts to eat large prey.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require day roosts that are in vertical or horizontal crevices, fissures, chambers in rock cliffs, or buildings. Night roosts may be shallow caves, cliff overhangs, or man-made structures. Hibernation sites are unknown in Canada, but a few have been found in caves and mines in the United States.

Sociality/Site Attachment

Occur in mixed colonies in the summer from a few individuals to about 100. Pallid Bats are capable of homing from several kilometres but not over long distances.

Activity and Movement Patterns

Nocturnal with two primary feeding periods at the beginning and end of the night. Hibernates during the winter in or near its summer ranges. Dispersal of juveniles occurs at the end of the summer.

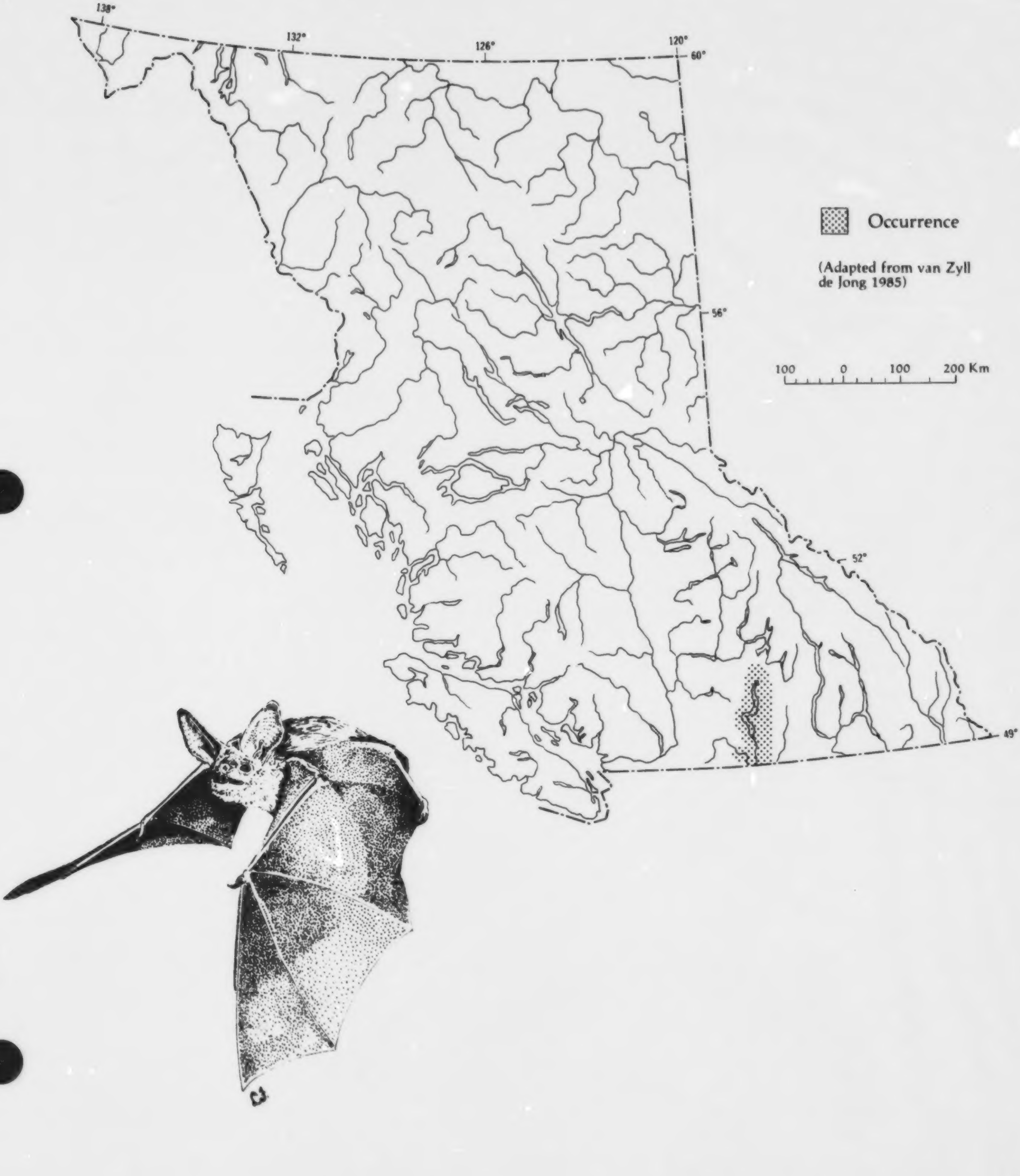
Status

Indeterminate, but because of limited range, Pallid Bats should at least be considered special and probably endangered in British Columbia. Protected as wildlife under the British Columbia Wildlife Act (1982).

Selected References

Barbour and Davis 1969; Hermanson and O'Shea 1983; O'Shea and Vaughan 1977; van Zyll de Jong 1985; Vaughn and O'Shea 1976.

Pallid Bat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(Adapted from van Zyll de Jong 1985)

Townsend's Big-eared Bat
PLTO
Plecotus townsendii Cooper
[Western Big-eared Bat]

Distribution, Seasonality and Abundance

In Canada, found only in British Columbia. Distributed in the southern interior, lower Fraser Valley to the coast, and the southeast coast of Vancouver Island. Native yearlong resident. Not abundant in British Columbia.

Habitat Requirements - Reproduction

HABITAT CLASSES: Vegetation class not as important as availability of suitable maternity roosts and hibernation sites. Occur both in coastal forests, dry shrublands, and ponderosa pine forests.

SPECIFIC HABITAT ELEMENTS: Breeding occurs in hibernation areas, usually caves or mine shafts. Females gather in nursery colonies to have their young (mid-July to mid-August). Nursery colonies are usually located in caves, mines, or buildings, where the bats roost in small clusters in warm microclimates.

Habitat Requirements - Feeding

HABITAT CLASSES: These bats have a wide environmental tolerance. Feed in a variety of habitats including coastal lowlands, such as western hemlock - western redcedar forests, agricultural habitats, Engelmann spruce - subalpine fir forests, and ponderosa pine parkland.

SPECIFIC HABITAT ELEMENTS: Feed primarily on small moths (3 to 10 cm), taken in flight but may also eat other insects. They are late feeders, usually emerging after full darkness. Temporary night roosts, such as a warm cave or other warm microclimate, are used during feeding periods.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require day roosts, usually in natural rock crevices, caves, mines, and abandoned buildings. Hibernate in caves or mines about 8 to 50 km from summer roosting areas. Hibernate in colonies, often in cool areas of caves unless the temperature becomes extremely cold. Very susceptible to human disturbance of maternity colonies and hibernation sites.

Sociality/Site Attachment

These bats have a high degree of site attachment. Home range size unknown.

Activity and Movement Patterns

Big-eared Bats are nocturnal and hibernate for several months in the winter. In California, begin arriving at their hibernation site in late October, reaching maximum density in January. Females arrive earlier and stay longer than males. This species is considered relatively sedentary, with little movement between hibernacula and summer roosts. During summer months, colonies of females and young occupy nursery roosts while males roost alone or in small groups.

Status

Probably not in jeopardy. Not protected.

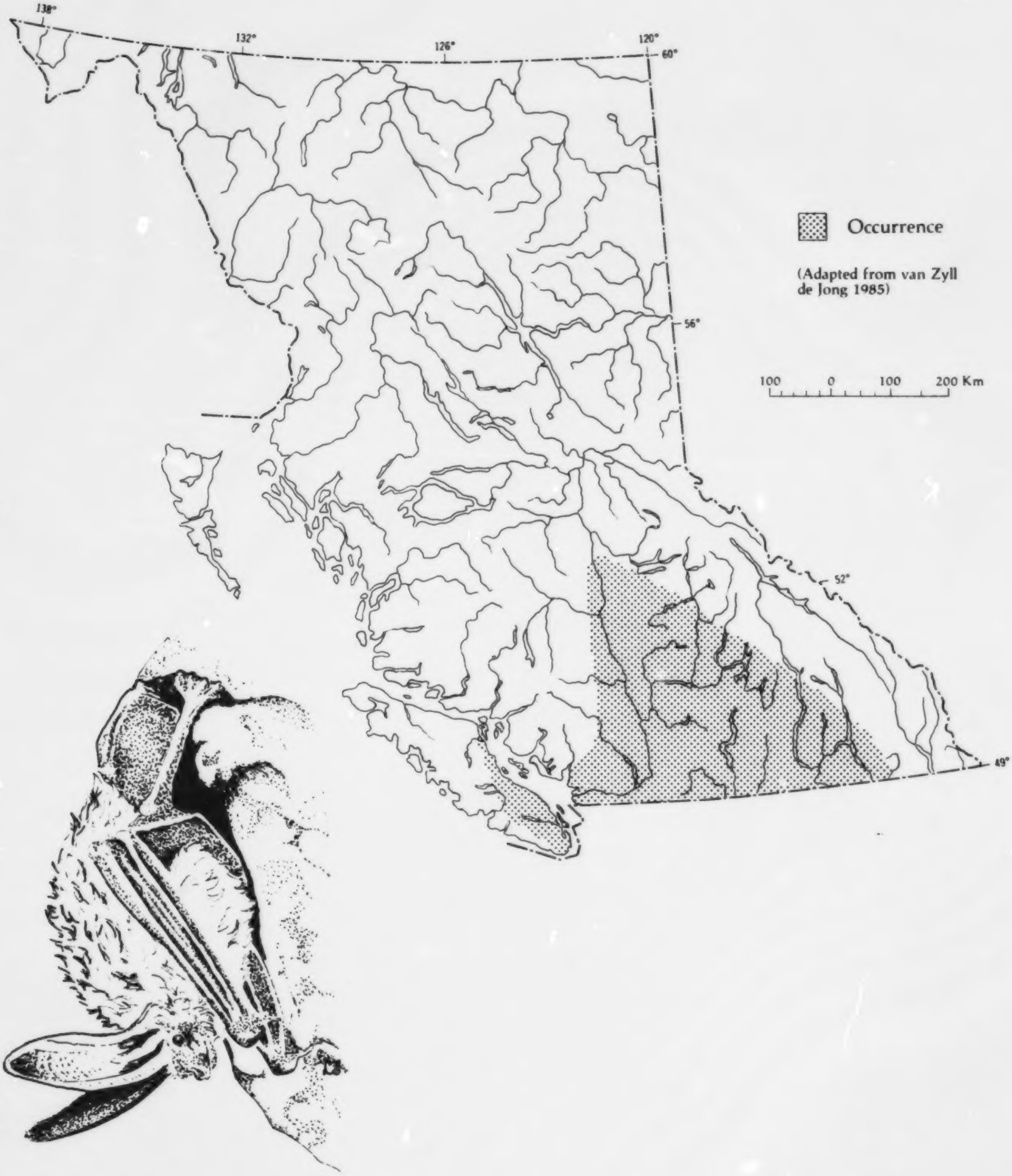
Other

These bats use mines and caves more than any other bat in the province. Have been found hibernating with Little Brown Myotis.

Selected References

Barbour and Davis 1969; Kunz 1982a; Kunz and Martin 1982; Maser *et al.* 1981; van Zyll de Jong 1985.

Townsend's Big-eared Bat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(Adapted from van Zyll de Jong 1985)

Pika
OCPR
Ochotona princeps (Richardson)
[American Pika, Rocky Mountain Pika]

Distribution, Seasonality and Abundance

Usually occur at high elevations (above 1100 m) in the Rocky Mountains north to Mount Robson, the Monashee and Selkirk ranges, the southern coastal area into the western part of the Chilcotin plateau, Shuswap Lakes, and Wells Gray Park areas. May be found as low as sea level where suitable habitat occurs. Common.

Habitat Requirements - Reproduction

HABITAT CLASSES: Alpine tundra and avalanche shrubland but may nest at lower elevations in suitable habitat.

SPECIFIC HABITAT ELEMENTS: Nest in deep crevices between rocks on talus slopes, rockslides etc.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in alpine tundra, alpine/subalpine wet meadows, avalanche shrubland, and talus shrubland. May forage at lower elevations in suitable habitat.

SPECIFIC HABITAT ELEMENTS: Diet consists mainly of graminoids and forbs such as lupine and thistle, but will also eat shrub shoots and some species of conifers. Will eat conifer seedlings from plantations. Begin making haystacks for winter food storage during the second week in July. Forage in the vegetation surrounding their rocky homes.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use rocky areas such as rock slides and talus slopes as escape terrain. Live under the snow during the winter.

Habitat Requirements - Pattern

Require rocky escape terrain close to foraging areas.

Territory/Home Range

Pikas are colonial and territorial. They share pathways and a central family nest. Small home range of 0.3 to 0.5 ha in Glacier National Park (Barash 1973).

Activity and Movement Patterns

Active all year, and intermittently day and night.

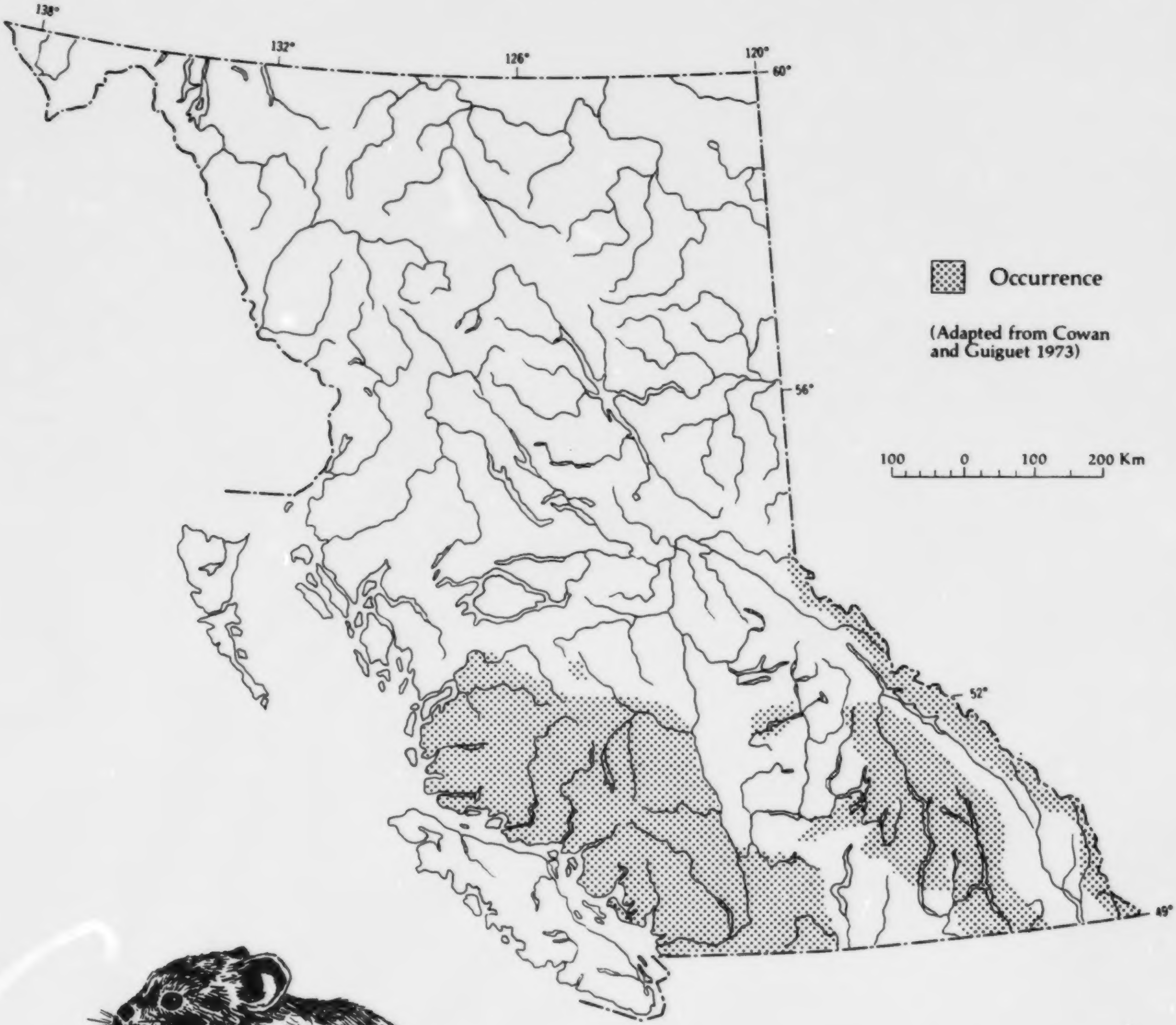
Status

Probably not in jeopardy. Not protected.

Selected References

Broadbooks 1965; Dalquest 1948; Harestad 1983; Johnson 1967; Smith 1974.

Pika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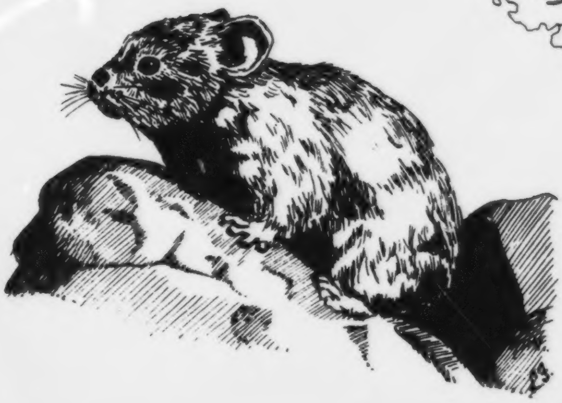
(Adapted from Cowan and Guiguet 1973)



Nuttall's Cottontail
SYNU
Sylvilagus nuttalli (Bachman)
[Mountain Cottontail]

Distribution, Seasonality and Abundance

Confined to the Okanagan and Similkameen valleys from Osoyoos to Summerland and from Osoyoos to Keremeos (Cowan and Guiguet 1965). Abundance in province is approximately 1 per 2-3 ha of sagebrush habitat. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Occur primarily in sagebrush steppe, but may also be found in agricultural habitats.

SPECIFIC HABITAT ELEMENTS: Nest in the burrows of other species or line cup-shaped depressions in the ground with fur.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; feed on narrow foraging trails in open areas, meadows, gullies, or along streams and lakes close to suitable cover. Generally use disturbed or successional habitats.

SPECIFIC HABITAT ELEMENTS: Summer diet of graminoids, forbs, and vegetables from domestic gardens when available. Winter diet is primarily bark, twigs, and buds of shrubs and trees. Capable of girdling small trees.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use resting sites, which are shallow depressions in dense cover or beneath logs and stumps. Require escape cover such as shrub layer, riparian thickets, forest litter, rocky areas, or burrows of other animals.

Habitat Requirements - Pattern

Requires escape cover close to foraging areas.

Activity and Movement Patterns

Most active periods are evening, night, and early morning. Active all year.

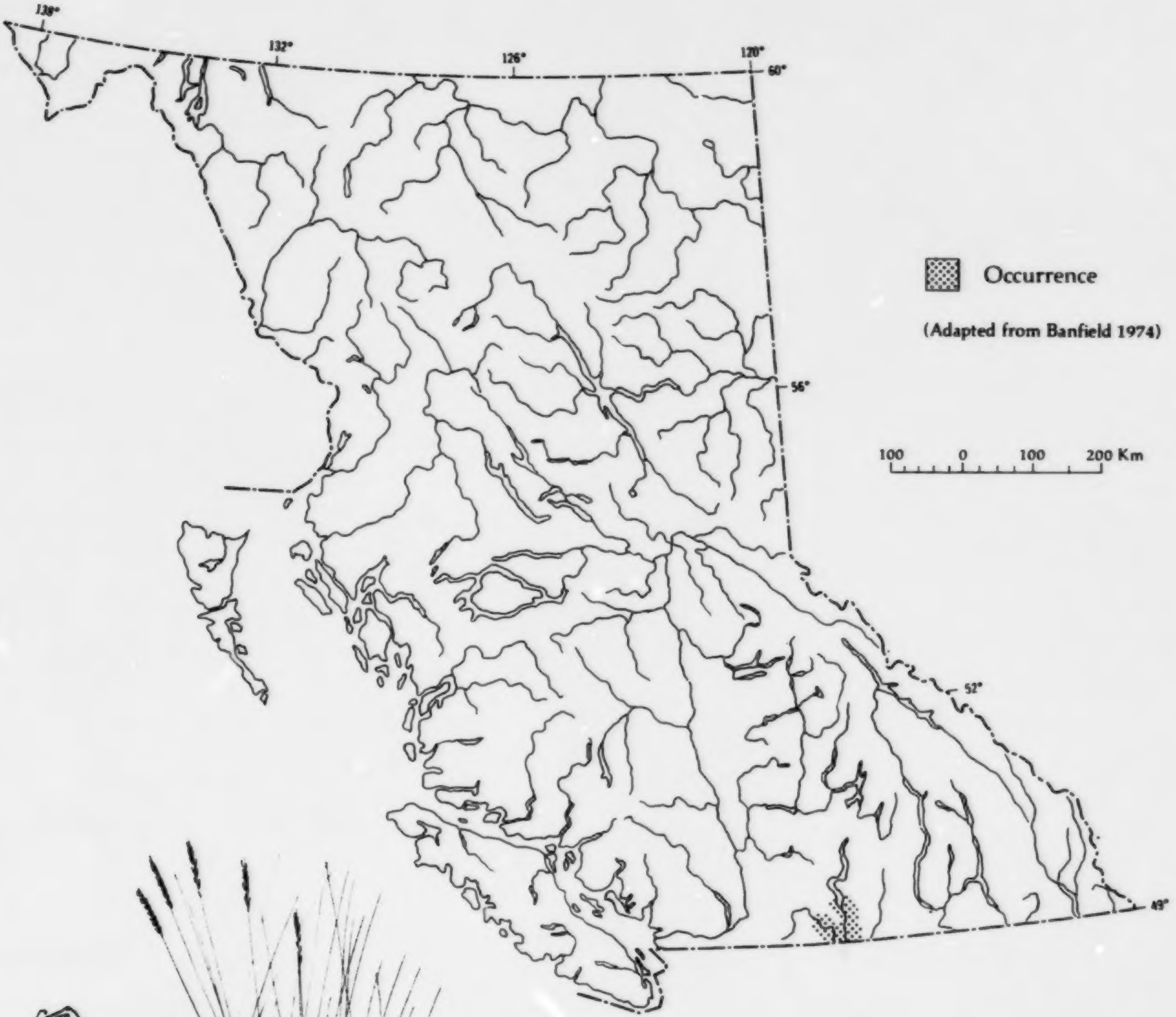
Status

Rare. Protected as wildlife under the British Columbia Wildlife Act (1982).

Selected References

Chapman *et al.* 1982; Harestad 1983.

Nuttall's Cottontail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(Adapted from Banfield 1974)

Snowshoe Hare
LEAM
Lepus americanus Erxleban
[Varying Hare]

Distribution, Seasonality and Abundance

Occur throughout mainland of the province in a variety of forested habitats. Common. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Reproduce in a variety of habitats such as conifer-dominated habitats and deciduous riparian forests; also birch-willow scrub/ parkland and shrub fens/carrs. Prefer young successional stages from 10-20 years after logging/burning.

SPECIFIC HABITAT ELEMENTS: The first of generally three litters are born in April with as many as 4 litters/year during a peak year. Nest in shallow forms or depressions in the ground under the cover of brushy undergrowth or thickets.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; prefer to forage in areas near brush cover. Will forage in burns, thickets, forest edges, and riparian inclusions.

SPECIFIC HABITAT ELEMENTS: Summer diet of graminoids, forbs, ferns, new shoots of woody plants, and conifer seedlings. In the winter, forage on top of the snow, which raises them to the level of buds, twigs, bark, conifer needles, and evergreen leaves of a variety of shrubs and trees. Aspen bark is particularly popular and young trees may be girdled during the winter.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require resting cover that is often a small depression in the ground beneath the branches of a small tree or shrub, underneath logs, or beneath the roots of a stump. The debris from logging or silvicultural activities provides good thermal and escape cover. Low growing woody vegetation is also used for escape cover.

Habitat Requirements - Pattern

Prefer semi-open forest interspersed with clearing, muskeg, or riparian thickets for foraging areas.

Territory/Home Range

In Alaska, home ranges varied from 4 to 10 ha with averages of 5 to 6 ha (O'Farrell 1965). Home range size is smaller where cover is abundant.

Activity and Movement Patterns

Crepuscular and active all year.

Status

Not in jeopardy. Not protected.

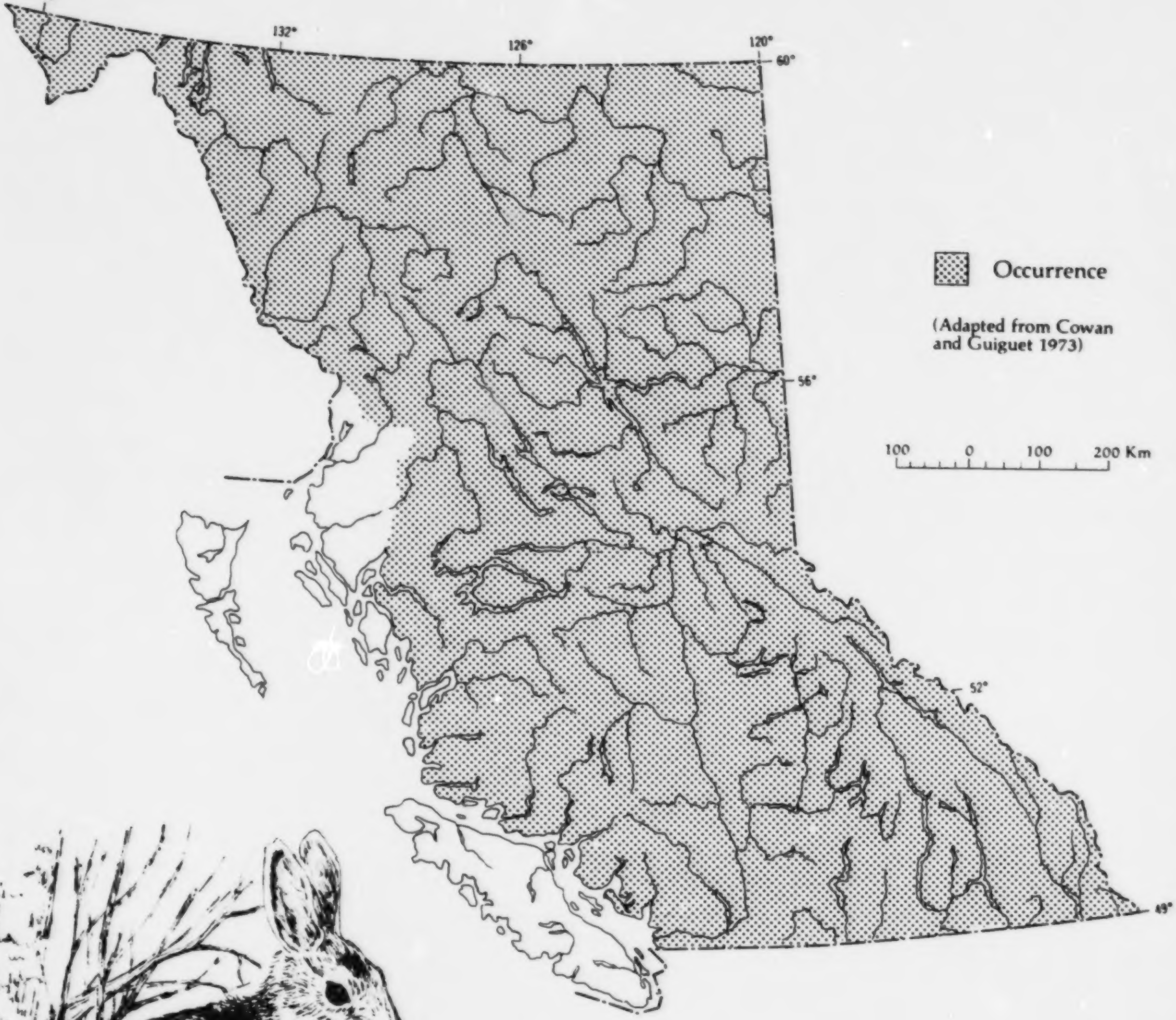
Other

Population size cycles with a periodicity of approximately 10 years. This has an effect on predator populations, especially Lynx.

Selected References

Bittner and Rongstad 1982; Dolbeer and Clark 1975; Harestad 1983; Keith and Surrendi 1971; Maser *et al.* 1981.

Snowshoe Hare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(Adapted from Cowan and Guiguet 1973)

White-tailed Jackrabbit
LETO
Lepus townsendii (Bachman)
[White-tailed Jack Rabbit]

Distribution, Seasonality and Abundance

Occur only in the southern Okanagan and Similkameen valleys. Formerly abundant but cultivation has reduced its numbers (Cowan and Guiguet 1973). Native yearlong resident. Rare.

Habitat Requirements - Reproduction

HABITAT CLASSES: Sagebrush steppe and agricultural habitats.

SPECIFIC HABITAT ELEMENTS: Young are born in June-early July. Scratch out forms 9-13 cm deep and 22-40 cm long, which are used for nests as well as daybeds. Usually screened on one side by thick brush, rocks, or tufts of grass.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage along well-defined trails through bunchgrass.

SPECIFIC HABITAT ELEMENTS: Herbivorous. Graminoids are the main element of their summer diet but some forbs are also eaten. Water requirements obtained from vegetation. Agricultural crops are eaten when the natural vegetation dries out. In the winter, feed on dried grasses, twigs, bark, and roots. Known to cause extensive damage to haystacks in some places, but not yet in British Columbia.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Eat mineral soils for salts and minerals. Rely on speed rather than cover for protection against predators. Utilize daybeds (see reproduction). In winter, burrow into snow drifts for thermal cover.

Territory/Home Range

Males tend to be more territorial than females except during breeding season. Likely that only their personal forms are actively defended. Home range averages 89.4 ha (Donoho 1972).

Activity and Movement Patterns

Generally nocturnal with the daylight hours spent motionless in their forms. Eat almost constantly when awake. Most active during dusk, early mornings, and moonlit nights. Normal activity patterns disrupted by strong winds, falling snow, and fog. Active all year.

Status

Indeterminate. Protected as wildlife under the British Columbia Wildlife Act (1982).

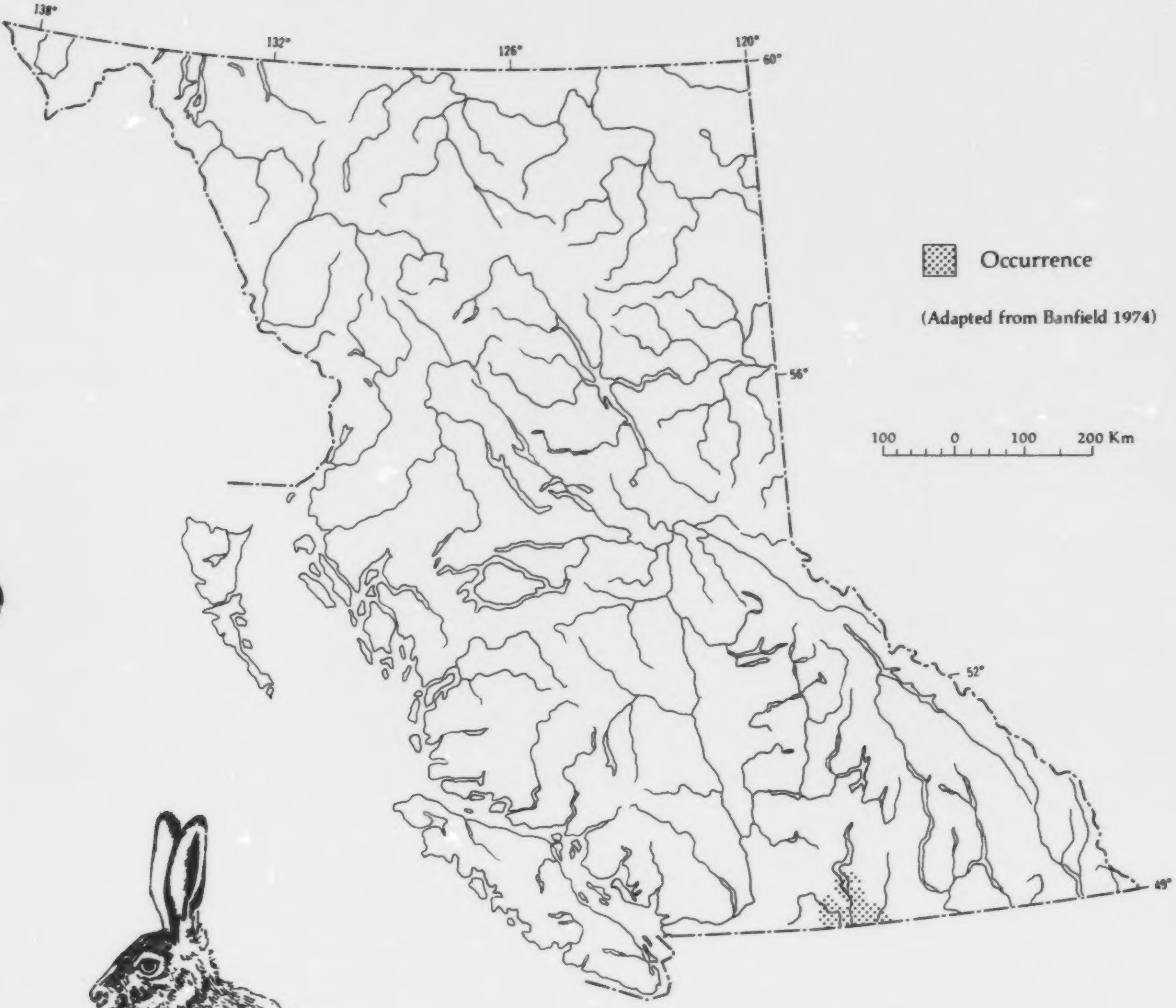
Other

Have been known to damage orchards and other agricultural areas during winter or drought in some areas, but numbers in British Columbia are so low at the present time that this is not a problem.

Selected References

Banfield 1974; Bear and Hansen 1966; Dalquest 1948; Dunn *et al.* 1982; Flinders and Hansen 1972.

White-tailed Jackrabbit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(Adapted from Banfield 1974)

Yellow-pine Chipmunk
TAAM
Tamias amoenus (J.A. Allen)
[Yellow Pine Chipmunk, Northwestern Chipmunk]

Distribution, Seasonality and Abundance

Distributed in southern mainland of the province from the coast to the Rockies, extending into the central plateau and mountain region west of the Fraser River and north to the Skeena Valley, generally at medium elevations but may occur up to timberline. Common native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats such as Douglas-fir - lodgepole pine forests, Douglas-fir - ponderosa pine forests, Engelmann spruce -subalpine fir forests and ponderosa pine parkland.

SPECIFIC HABITAT ELEMENTS: Young are born in winter nest, between mid-May and early June. Nests are located underground at the base of stumps, beneath windfalls, or in rock crevices. This species excavates its own burrow in loose soil.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; prefer open woods, forest edges, clearings, brushy areas, and rocky outcrops.

SPECIFIC HABITAT ELEMENTS: Seeds and flowers are the main source of food, but fruits, corms, fungi, insects, and animal matter are also eaten. Forage on the ground and climb into conifers for seeds. Store food in underground caches for winter use.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Tree nests, usually 2-3 m from the ground in low trees, are used for resting during the summer. May use a woodpecker hole for this purpose. Require escape cover such as rocky or brushy areas, or a dense herbaceous layer. Winter nests for hibernation are found at the base of stumps, beneath windfalls, in rock crevices, or burrows in the ground.

Territory/Home Range

Defend area immediately surrounding den. Male home ranges average 1.25 ha and female home ranges average 0.5 ha (Woods 1980).

Activity and Movement Patterns

Diurnal with peaks of activity in early morning and later afternoon. Hibernate during the winter, but appear to wake up periodically to feed on stored food.

Status

Not in jeopardy. Not protected.

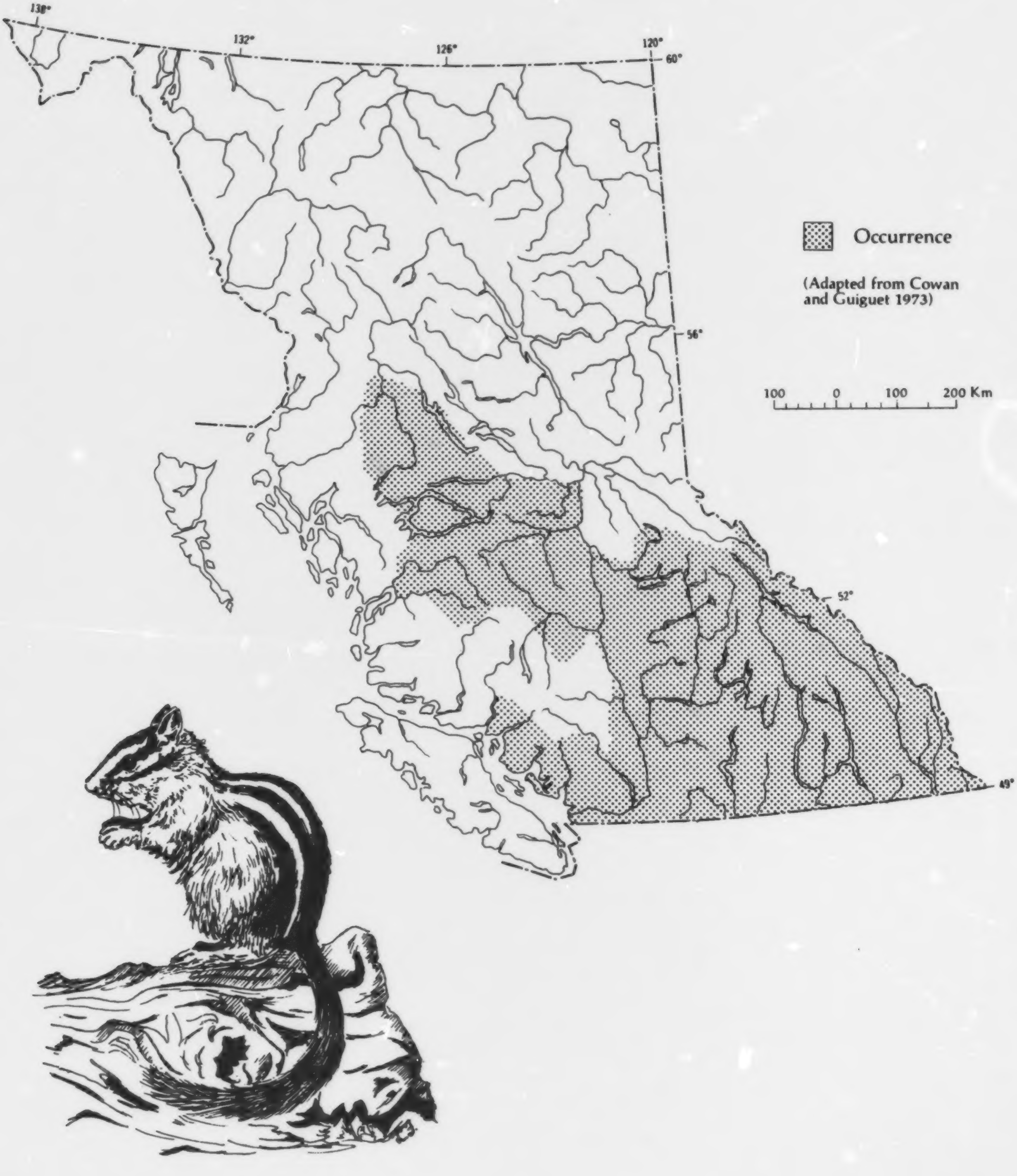
Other

Have been shown to be important disperser of spores from hypogeous mycorrhizal-forming fungi thus contributing to the formation of essential mycorrhizal symbiosis on the roots of many coniferous trees (Maser *et al.* 1978).

Selected References

Banfield 1974; Broadbooks 1958, 1970.

Yellow-pine Chipmunk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(Adapted from Cowan and Guiguet 1973)

Yellow-bellied Marmot
MAFL
Marmota flaviventris
[Audubon and Bachman]

Distribution, Seasonality and Abundance

Occur in the southern interior from Hope to Trail, including the southern Cariboo, the Okanagan, and Nicola Valley. Common in suitable habitat. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Hotter, more arid habitats such as sagebrush steppe, talus shrubland, ponderosa pine parkland, and Douglas-fir - ponderosa pine forests.

SPECIFIC HABITAT ELEMENTS: Young are born in early May in burrows in rock piles, rocky hillsides, low cliffy areas, talus slopes, or under buildings.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage in open herbaceous areas such as grasslands, sedge meadows, forest openings, and agricultural areas, close to rocky cover.

SPECIFIC HABITAT ELEMENTS: Feed on a wide variety of plant foods including graminoids, forbs such as dandelion or clover, bark, seeds, and fleshy roots. May eat vegetables from domestic gardens when available.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require rocky areas such as rock-piles, low cliffy areas, and talus slopes for burrows that provide escape cover, a resting site at night, and a den for hibernation. Vulnerable to freezing in winter so prefer to hibernate in areas with deep snow cover.

Habitat Requirements - Pattern

Forage areas must be situated close to rocky cover.

Territory/Home Range

Usually found in loose colonies with overlapping home ranges. Adult males defend a territory around the burrow during the active season while the females defend their burrow only during pregnancy and lactation. Males are aggressive towards other males, but allow several females in their colony. In Colorado, home range sizes varied from 2-10 ha (Armitage 1974).

Activity and Movement Patterns

Hibernate from August to late March/April (Cowan and Guiguet 1973). May spend up to 80% of their life in dens. Mainly diurnal during their active season. Usually only yearling males disperse. Adult males drive them away in early June and the mean distance travelled is 2.45 ± 0.557 km (Donaldson 1978).

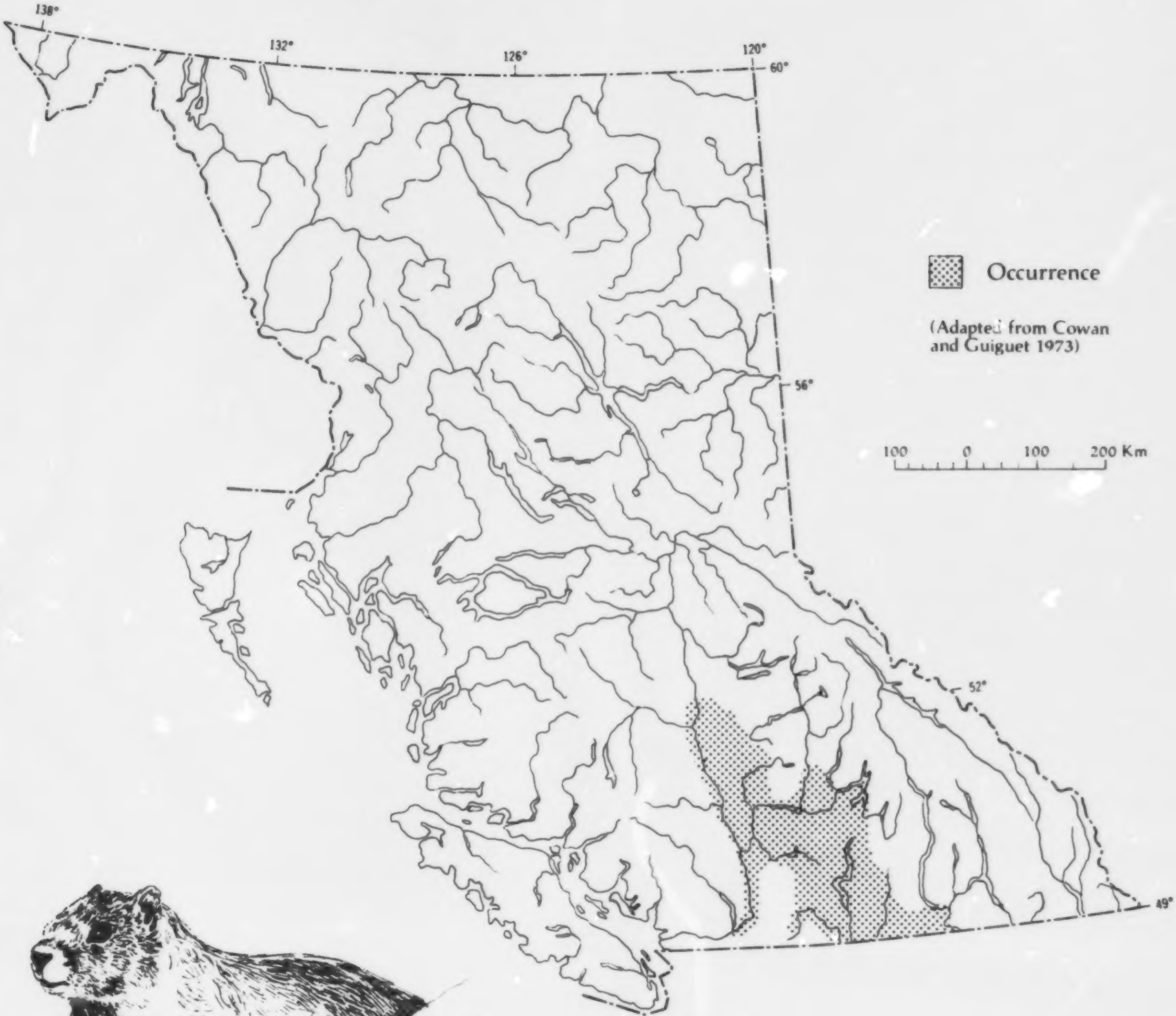
Status

Probably not in jeopardy. Not protected.

Selected References

Fraser and Hoffman 1980; Lee and Funderburg 1982; Lortie 1967; Svendson 1974.

Yellow-bellied Marmot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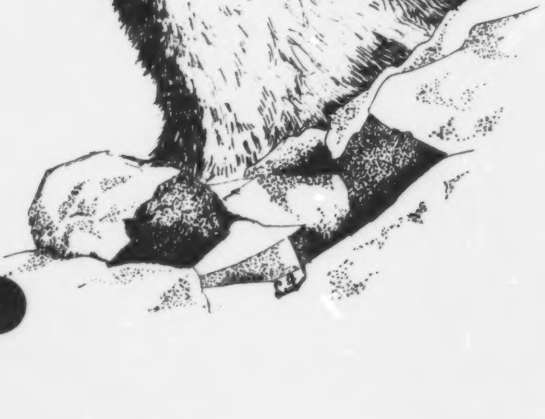


Hoary Marmot
MACA
Marmota caligata (Eschscholtz)
[Whistler]

Distribution, Seasonality and Abundance

Found throughout the mountainous areas of the mainland at high elevations. Native yearlong resident. Common.

Habitat Requirements - Reproduction

HABITAT CLASSES: High elevation meadows and talus slopes near timberline.

SPECIFIC HABITAT ELEMENTS: Burrows used as a nest for young and for protection. Dig deep burrows under large boulders to protect from digging predators such as Grizzly Bears.

Habitat Requirements - Feeding

HABITAT CLASSES: Alpine and subalpine meadows.

SPECIFIC HABITAT ELEMENTS: Use a variety of herbaceous plants. Live on stored body fat during hibernation.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use deep burrows for hibernation from September to April. During the rest of the year their burrows are used for escape cover and cover from thermal extremes. During the active part of the year, large boulders (greater than 2 m in diameter) are used for sunning and alarm calling (Tyser 1980).

Activity and Movement Patterns

Diurnal. Active from April to September. Juvenile dispersal occurs at age 2 or 3, late by comparison with the Woodchuck.

Status

Not in jeopardy. Not protected.

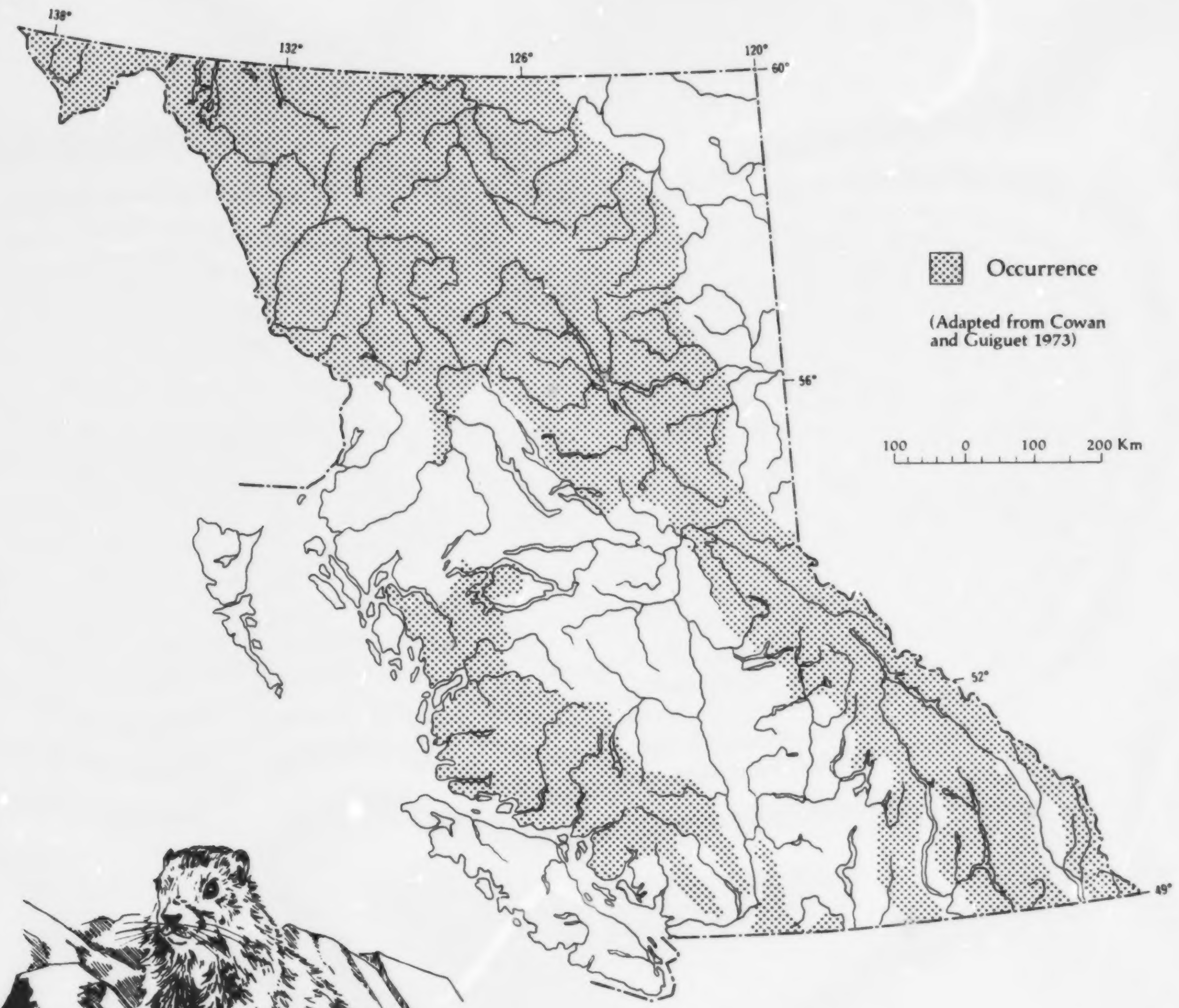
Other

A colonial species. A colony consists of 1 adult male and several adult females. Adulthood is reached at age 3.

Selected References

Barash 1974; Cowan and Guiguet 1973; Lee and Funderburg 1982.

Hoary Marmot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(Adapted from Cowan and Guiguet 1973)

Columbian Ground Squirrel
SPCO

Spermophilus columbianus (Ord)
[Columbian Groundsquirrel]

Distribution, Seasonality and Abundance

Distributed in the drier, low elevation areas in the southeastern and south-central parts of the province as well as the alpine areas of the Selkirks, Monashees, and southern Rocky Mountains. Common. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Usually in open areas, such as alpine tundra, alpine/subalpine wet meadow, sagebrush steppe, ponderosa pine parkland, and Douglas-fir - ponderosa pine forests.

SPECIFIC HABITAT ELEMENTS: Mating occurs soon after the females emerge from hibernation. Parturition occurs from early May at low elevations to late June in high elevations. Nest in burrows, which are usually extensive, with several entrances next to stumps, logs, or stones. Prefer friable or light sandy soils with good drainage.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage on the ground near burrows.

SPECIFIC HABITAT ELEMENTS: Mainly herbivorous. Prefer green vegetation, roots, and seeds but will eat mice, insects, and ground-nesting birds. Also feed on garden vegetables and cultivated grains. Summer burrows are located near a primary food source.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Utilize summer burrows for resting, thermal, and escape cover. Hibernate in dens that are usually deeper than summer burrows.

Territory/Home Range

Colonial territories dominated by a territorial male. Colony includes harem of females with juveniles and yearlings of both sexes.

Activity and Movement Patterns

Spend 7 to 8 months of the year in aestivation or hibernation. Diurnal during active period. Most foraging activity occurs in the morning and late afternoon. Males usually disperse as yearlings.

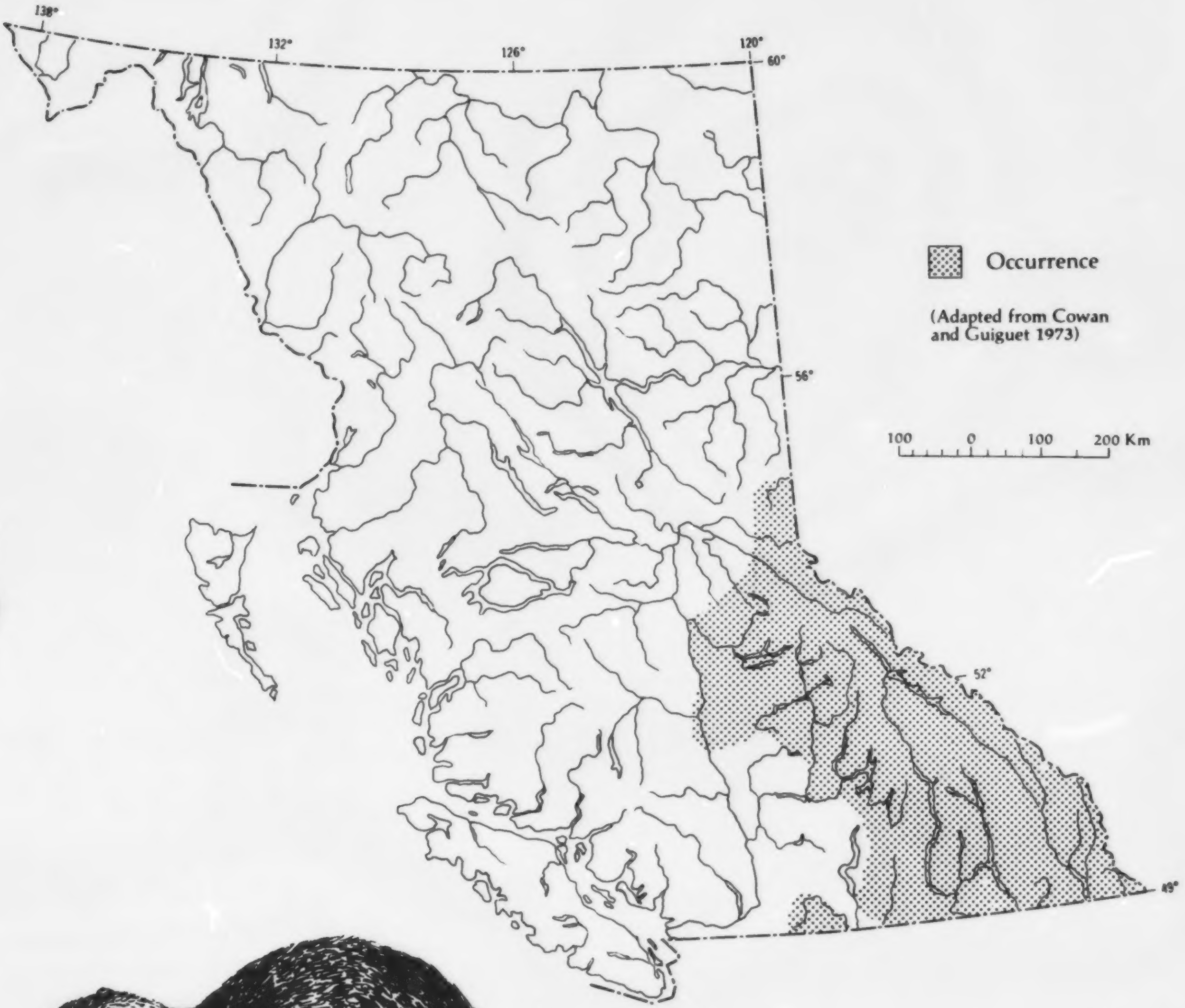
Status

Probably not in jeopardy. Not protected.

Selected References

Banfield 1974; Shaw 1925, 1945.

Columbian Ground Squirrel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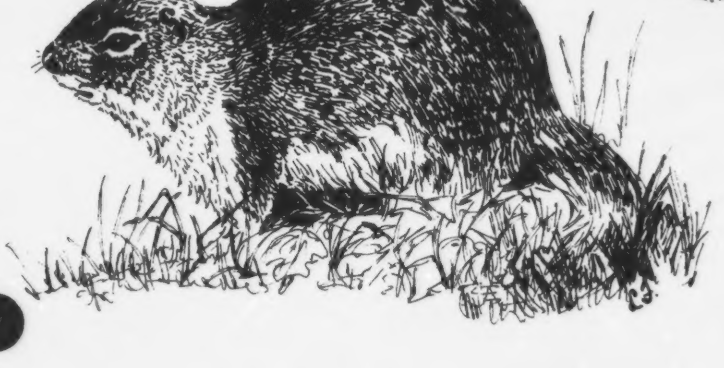


Cascade Golden-mantled Ground Squirrel

SPSA

Spermophilus saturatus (Rhoads)
[Golden-mantled Ground Squirrel,
Cascade Mantled Groundsquirrel]

Distribution, Seasonality and Abundance

Restricted to the area bordered by the Tulameen and Similkameen Rivers on the northeast and east and the summit of the Cascade Mountains on the west. Native yearlong resident. Rare due to restricted range.

Habitat Requirements - Reproduction

HABITAT CLASSES: Open, dry forest from valley bottoms to at least 2300 m.

SPECIFIC HABITAT ELEMENTS: Use talus, broken rock, stumps, or fallen timber for shelter. Underground burrows are used, presumably for nesting.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction.

SPECIFIC HABITAT ELEMENTS: Eat primarily fruit and seeds from the ground. Body fat is stored for use during hibernation.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use underground burrows for hibernation.

Activity and Movement Patterns

Diurnal. Active from about April or May through August. Hibernate during the fall and winter.

Status

Indeterminate. Not protected.

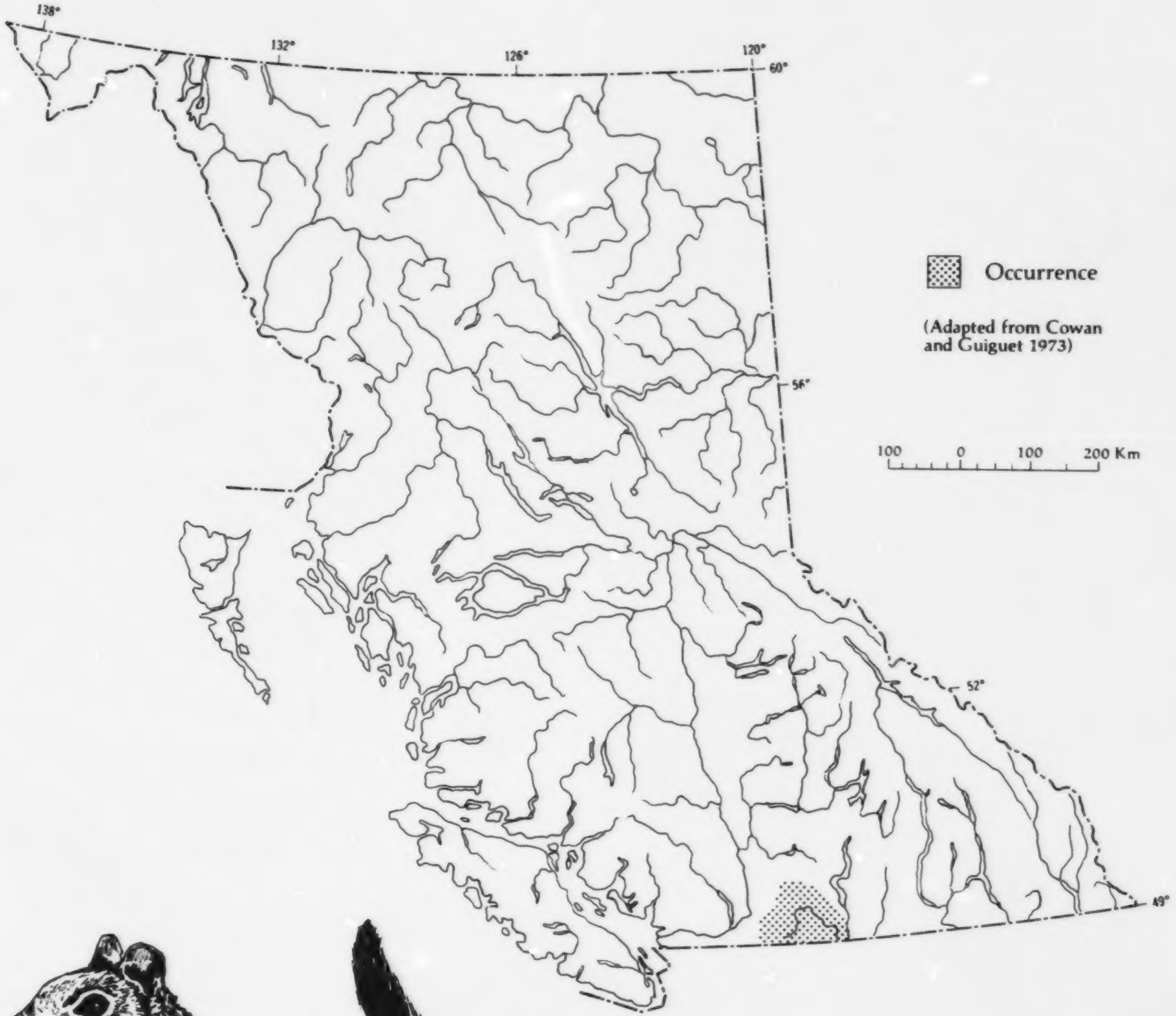
Other

Occur sympatrically with the Yellow-pine Chipmunk, which uses the same resources. Yellow-pine Chipmunk gathers food from the tree tops while the ground squirrel gathers from the ground.

Selected References

Cowan and Guiguet 1973; Ingles 1965

Cascade Golden-mantled Ground Squirrel



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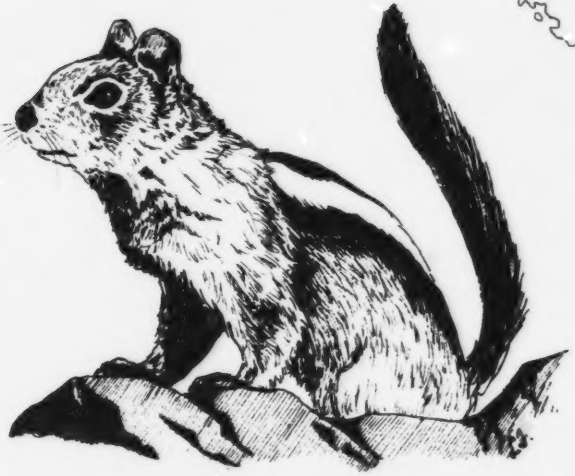


Red Squirrel
TAHU
Tamiasciurus hudsonicus (Erxleben)
[American Red Squirrel]

Distribution, Seasonality and Abundance

Occur in coniferous and mixed forest habitats from sea level to the alpine zone throughout the province except the southern coast. Native yearlong resident. Introduced to the Queen Charlottes.

Habitat Requirements - Reproduction

HABITAT CLASSES: Conifer-dominated habitats.

SPECIFIC HABITAT ELEMENTS: Natural cavities in trees are the preferred nest site although will also build outside tree nests of leaves and bark or utilize underground burrows. White spruce is a preferred nest site. Large diameter trees are chosen over small diameter and dense branch structure over sparse branching.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage in trees and on the ground.

SPECIFIC HABITAT ELEMENTS: Conifer seeds are the most important diet item, especially white spruce, lodgepole pine, and Douglas-fir seeds. Also eat fungi, berries, insects, forbs, and small vertebrates. Store conifer seeds in the cone for winter use. Occasionally mushrooms are also dried and stored.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require nests for resting, escape cover, thermal cover, and reproduction.

Territory/Home Range

Defend entire home range, especially during the fall. Home range size averages 1 ha (Chan 1982).

Activity and Movement Patterns

Active all year but will remain in nests during severe winter weather. Primarily diurnal.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

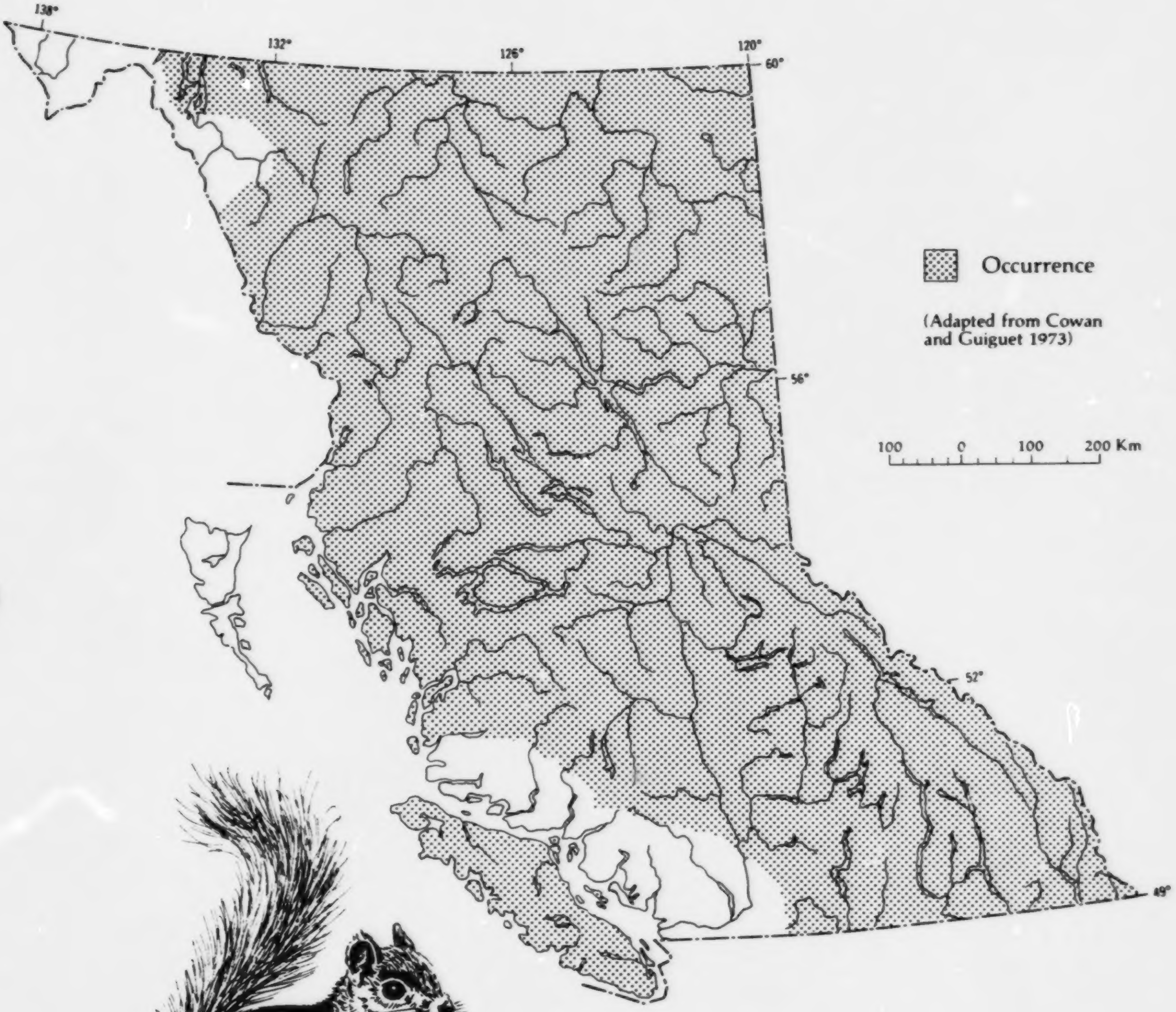
Other

Trapping of Red Squirrels may adversely affect the Marten population. Forest fires are devastating to Red Squirrel populations as they climb trees to escape danger. Important to the dispersal of mycorrhizal-forming fungi.

Selected References

Banfield 1974; Jackson *et al.* 1980; Klugh 1927; Wolff and Zasada 1975.

Red Squirrel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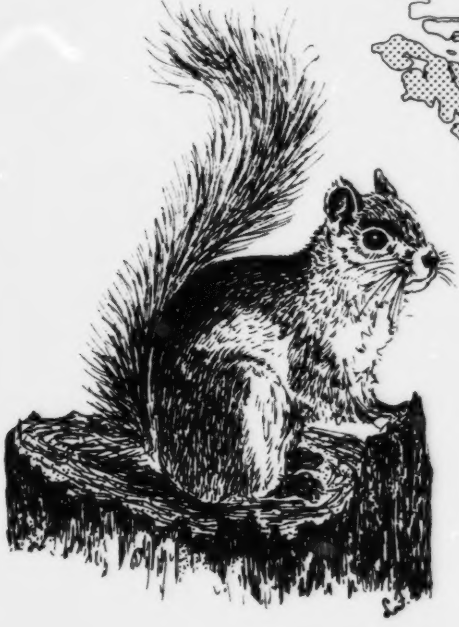


Northern Flying Squirrel
GLSA
Glaucomys sabrinus (Shaw)

Distribution, Seasonality and Abundance

Occur throughout mainland of the provicnce in coniferous forests from sea level to 2000 m. Native yearlong resident. Common.

Habitat Requirements - Reproduction

HABITAT CLASSES: Conifer-dominated and mixed forest habitats.

SPECIFIC HABITAT ELEMENTS: Young are born in May in tree cavity nests between 2 and 10 m from the ground usually in old trees or snags. Several nests are usually available to a single pair in their home range. The female and her young usually move to larger outside nests of sticks, mosses, and lichens built in tree branches.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage in trees and on the ground.

SPECIFIC HABITAT ELEMENTS: Omnivorous. Lichens and hypogeous fungi are important foods. Also feed on buds, fruits, seeds, shrubs, mosses, forbs, insects, nestling birds, eggs, and carrion. Outside nests are used for feeding stations. Make large caches of food.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Some trees in habitat must be at least 17 m high. Prefer mature to overmature seral stages. Movement mainly restricted to forested areas. Require suitable nesting sites for resting and thermal cover. These may be tree cavity nests or bark and twig nests built in conifer trees from 1-15 m above the ground.

Territory/Home Range

Home range averages about 2 ha with larger areas in open forests and smaller areas in dense forests (Woods 1980).

Activity and Movement Patterns

Primarily nocturnal. Woods (1980) reported the Northern Flying Squirrel to be active all winter regardless of temperature while Cowan and Guiget (1973) reported periods of torpor during severe winter weather. Juveniles disperse at 4 months or following one winter of denning with the mother.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

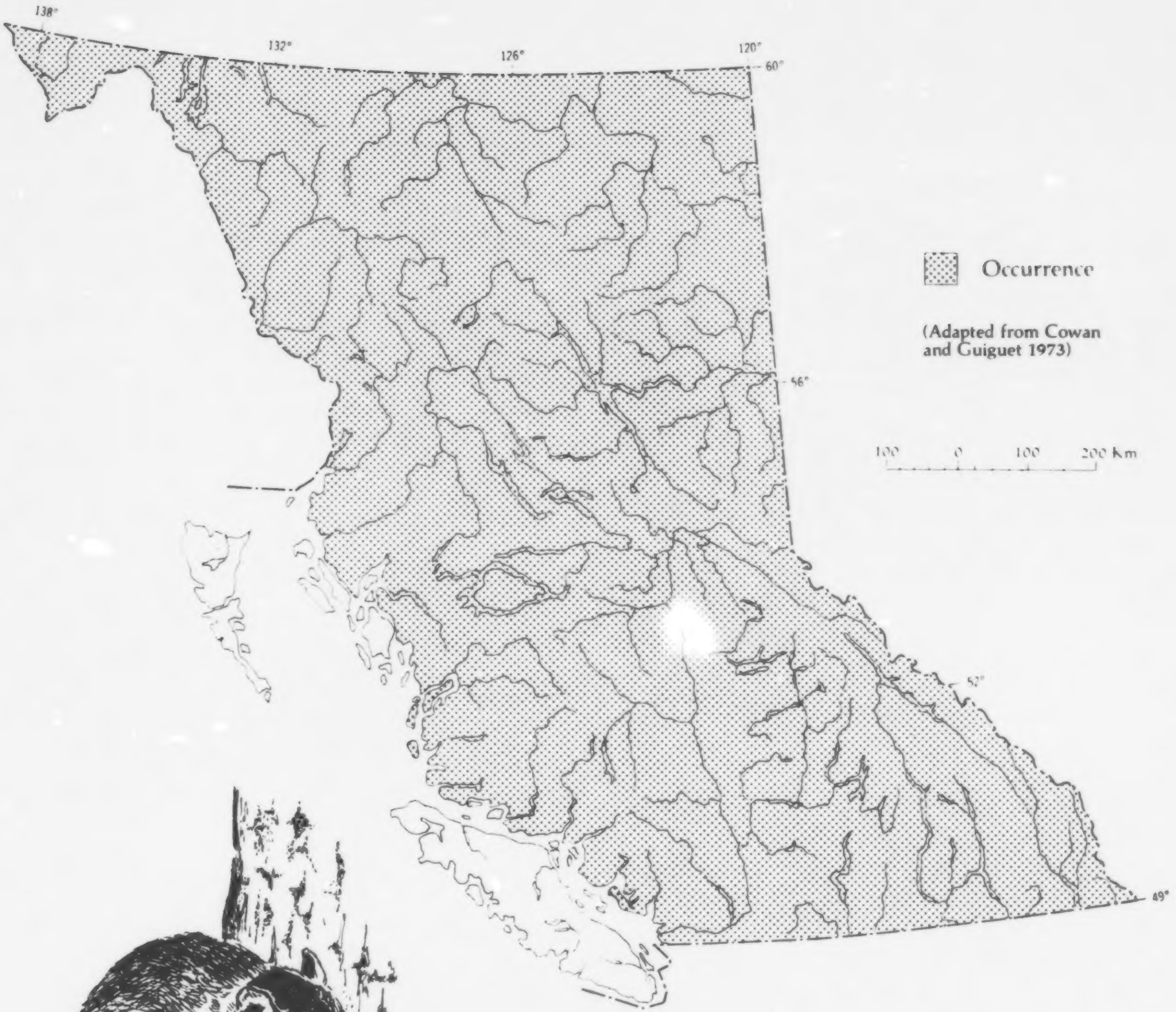
Other

The number of available nesting sites appears to be critical to Northern Flying Squirrel density. An increase in the number of outside nests may be indicative of forest practices that decrease the number of available snags. Large scale habitat changes due to forestry and urbanization are suspected to cause large declines in Northern Flying Squirrel populations. Disperser of beneficial mycorrhizal- forming fungi (Maser *et al.* 1981).

Selected References

Cowan 1936, Hokkanen *et al.* 1982; Maser *et al.* 1981.

Northern Flying Squirrel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(Adapted from Cowan and Guiguet 1973)

Northern Pocket Gopher
THTA
Thomomys talpoides (Richardson)

Distribution, Seasonality and Abundance

Distributed in southern interior of the province from valley bottoms to alpine meadows, where suitable soils occur. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Limited by soil type, not vegetation class.

SPECIFIC HABITAT ELEMENTS: Pocket gophers are adapted to digging. They inhabit areas with fine, loamy soil, often on cultivated benchlands, old logging roads, or lawns. Prefer soils that are light in texture, porous, and well drained, but will utilize a variety of shallow and/or coarser soils. Young are born in chambers in underground burrows.

Habitat Requirements - Feeding

HABITAT CLASSES: Limited by soil type. Found in such habitats as southern bunchgrass steppe, open ponderosa pine parkland, early seral stages of forested habitats such as Douglas-fir - ponderosa pine and alpine/ subalpine wet meadows. Avoid areas with dense shrub or tree cover.

SPECIFIC HABITAT ELEMENTS: Prefer perennial forbs. During summer, most foraging occurs above ground close to burrow entrances; during winter, most foraging occurs underground for roots, bulbs, and tubers. Food is cached for winter use. Gophers may also forage under the snow. Satisfy all water requirements with their food.

Habitat Requirements - Pattern

Aboveground foraging areas must be close to burrow systems.

Territory/Home Range

Generally solitary. Home ranges average about 250 m^2 for males and 120 m^2 for females (Chase *et al.* 1982).

Activity and Movement Patterns

Primarily subterranean. Active yearlong; spend most of the winter in their burrows, which may be subnivean. Dispersal occurs above ground, usually in spring and early summer. Rivers and rugged mountains are barriers to movement. Still colonizing northwards.

Status

Not in jeopardy. Not protected.

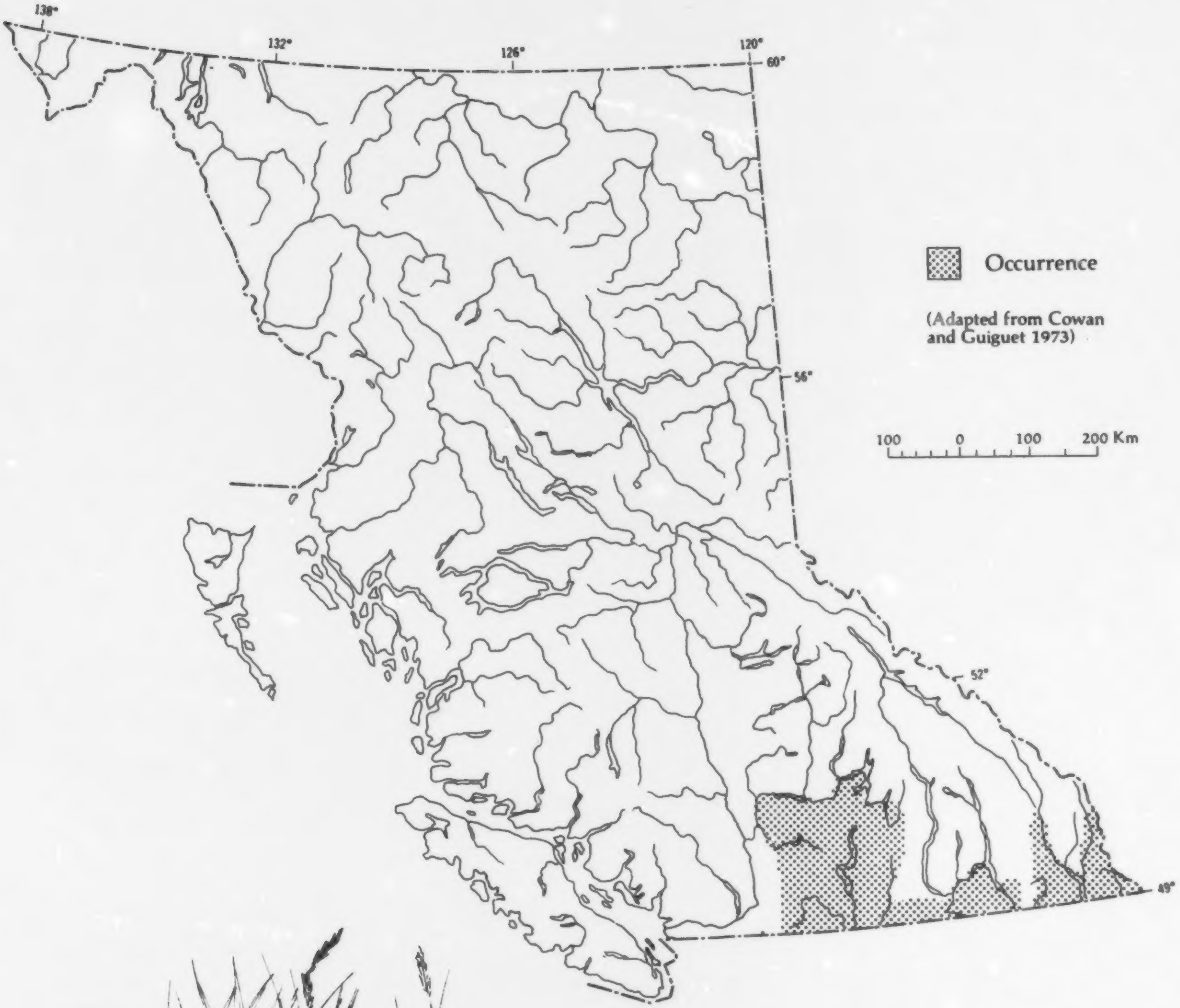
Other

Gophers have been shown to be an important part of the prairie ecosystem, enriching and aerating soils impacted by heavy trampling and grazing. Their abandoned burrows may be used by other species.

Selected References

Banfield 1974; Chase *et al.* 1982; Criddle 1930.

Northern Pocket Gopher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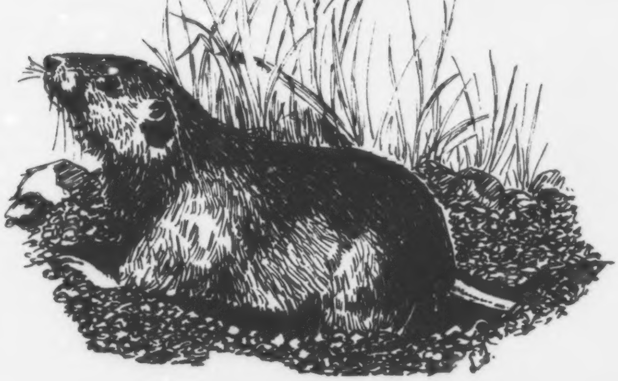


Great Basin Pocket Mouse
PEPA
Perognathus parvus (Peale)

Distribution, Seasonality and Abundance

Occur in lower elevations (300-500 m) of the Okanagan, Similkameen, and Thompson River valleys. Also occurs on a plateau at 1000 m on Anarchist Mountain and as far east as Midway. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Reproduce in sagebrush steppe and ponderosa pine parkland.

SPECIFIC HABITAT ELEMENTS: Young are born in circular nest cavities within a shallow network of tunnels.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements.

SPECIFIC HABITAT ELEMENTS: Seeds, green plant material, insects, and caterpillars are eaten during the summer. Winter stores are made up almost entirely of seeds. Do not require a water source.

Habitat Requirement - Special Needs

SPECIFIC HABITAT ELEMENTS: Dig burrow systems, 60-90 cm deep in sandy soils as escape and thermal cover. Occupy burrows during the day and in the winter. Winter nests are usually constructed 1-2 m below the surface.

Habitat Requirements - Pattern

Forage areas must be close to entrance of burrow systems.

Territory/Home Range

Solitary. Home ranges of both sexes overlap with the males averaging about 895 m^2 and the females about 656 m^2 (Iverson 1967).

Activity and Movement Patterns

Nocturnal and crepuscular during active time of year. Dormant during the winter (6-7 months).

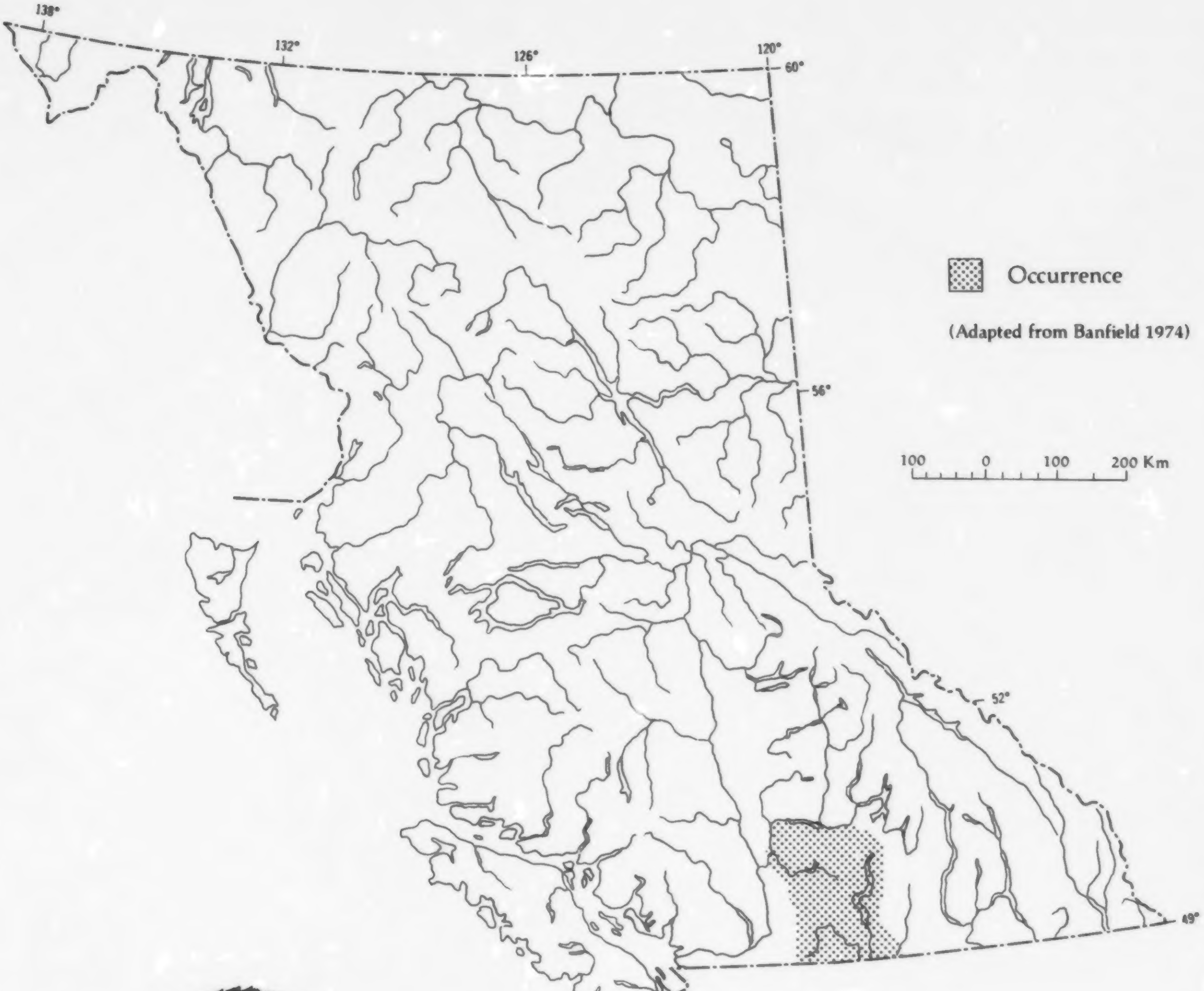
Status

Not protected but receiving special attention from Wildlife Branch.

Selected References

Banfield 1974; Ingles 1965; Iverson 1967; O'Farrell *et al.* 1975.

Great Basin Pocket Mouse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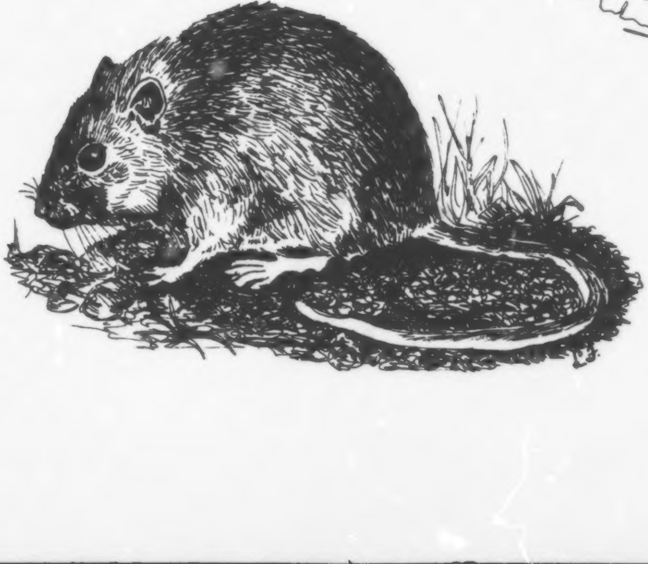


Beaver
CACA
Castor canadensis (Kuhl)
[American Beaver]

Distribution, Seasonality and Abundance

Common throughout the province in areas with suitable habitat. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Deciduous-dominated or mixed forest habitats with appropriate freshwater bodies.

SPECIFIC HABITAT ELEMENTS: Stable water conditions are essential for reproduction. Water must be deep enough for construction of a lodge or a bank den, and for exit during the winter when water is frozen. Availability of good lodge building materials is also important. Alder is the preferred building material. If stream habitat rather than ponds is being used, Beavers may dig a burrow in the bank rather than build a lodge.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in deciduous-dominated or mixed forest habitats.

SPECIFIC HABITAT ELEMENTS: Composition of available woody plant species is an important consideration of Beaver habitat. Trembling aspen is the most popular diet item, followed by willow, cottonwood, and poplar. As a general rule, good aspen groves can support many Beavers for a short time, whereas regenerating species such as willow can support a few Beaver indefinitely. To accommodate this, Beavers shift their cutting sites. This allows regrowth and regeneration of cut trees and maintains their food supply. During the summer, aquatic emergents and graminoids, such as pond lilies, cattails, and sedges, are consumed.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Stable, calm water is the most important consideration of Beaver habitat. Good building materials and solid banks to support dams and lodges are also important. Aspen is cut extensively and used as a building material.

Habitat Requirements - Pattern

The close proximity of the required woody species to bodies of water is important, especially in areas with predators. In the absence of predators, Beaver have been known to work 150 m from the water, but there may be a 25 m limit where serious predation is present.

Territory/Home Range

Adult Beavers occupy set home ranges and defend scent-marked territories. Aggression between Beavers is rare.

Activity and Movement Patterns

Although Beaver do not hibernate, they become quite inactive during the winter, relying on stored food and the fat in their tails. Beaver are most active during the night, spending the first half of the night feeding and the second half building or repairing dams and buildings. Dispersal occurs in the spring between their first and third years. Age of dispersal depends on habitat quality and saturation. Average distance travelled is from 8 to 16 km.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

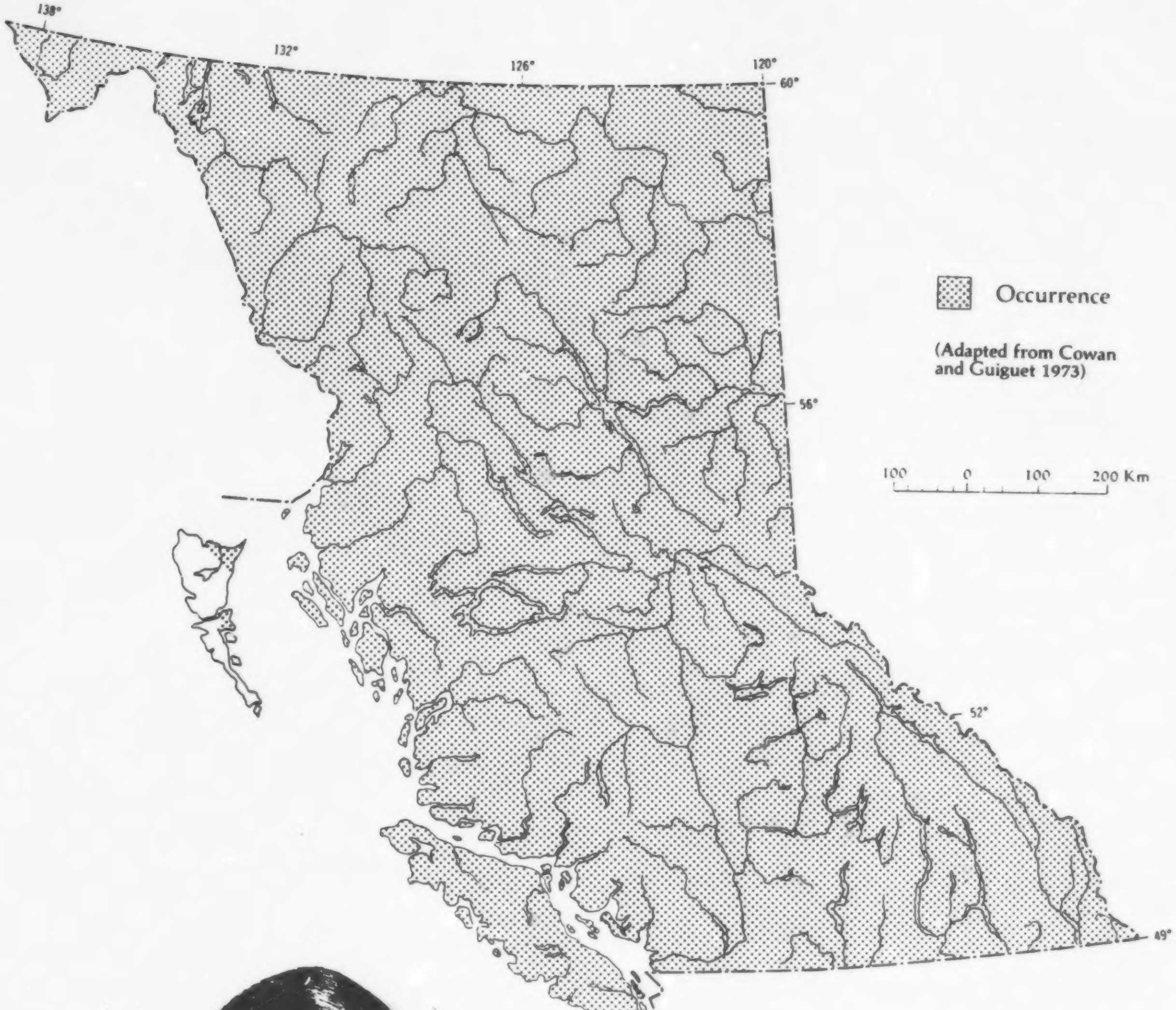
Other

Beavers affect their habitat more than most mammals. The flooding caused by the construction of dams increases the number of ducks, Muskrat, and Mink, and provides better range for browsing animals. The standing crop of plankton is 5 times higher in Beaver ponds than in other parts of the stream and there are increased numbers and diversity of invertebrates. There is also an increase in the size, variety, and abundance of fish (Hanson and Campbell 1963). Water impoundment by Beaver helps prevent flash floods and creates reservoirs that are helpful during times of drought. Abandoned Beaver ponds become meadow areas that are favourable for grazing animals.

Selected References

Hill 1982; Munro and Fyfe 1979.

Beaver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(Adapted from Cowan and Guiguet 1973)

Western Harvest Mouse
REME
Reithrodontomys megalotis (Baird)

Distribution, Seasonality and Abundance

Occur only in the lower elevations of the Okanagan Valley, north as far as Summerland. Native yearlong resident. Rare.

Habitat Requirements - Reproduction

HABITAT CLASSES: Sagebrush steppe and agricultural habitats.

SPECIFIC HABITAT ELEMENTS: Young are born in a nest of dried vegetation either on the ground under grass, shrubs, or logs or hanging in vegetation.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forages in grasslands, vegetated areas bordering lakes, streams, irrigation ditches, and in deciduous ravines of willow, rose, and trembling aspen.

SPECIFIC HABITAT ELEMENTS: Summer diet consists of graminoids and forbs. In late summer and fall, feeds primarily on seeds. Also feeds on fruit and insects. Food storage is limited. May utilize vole runways for foraging.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Utilize nests for resting sites. Nests are small balls of grass about the size of a baseball, hidden in vegetation. Require escape cover such as a herbaceous or shrub layer.

Territory/Home Range

Colonial. In California, circular or elliptical home ranges averaged 3500 m^2 (Webster and Jones 1982).

Activity and Movement Patterns

Active all year long. Nocturnal and especially active on moonless nights.

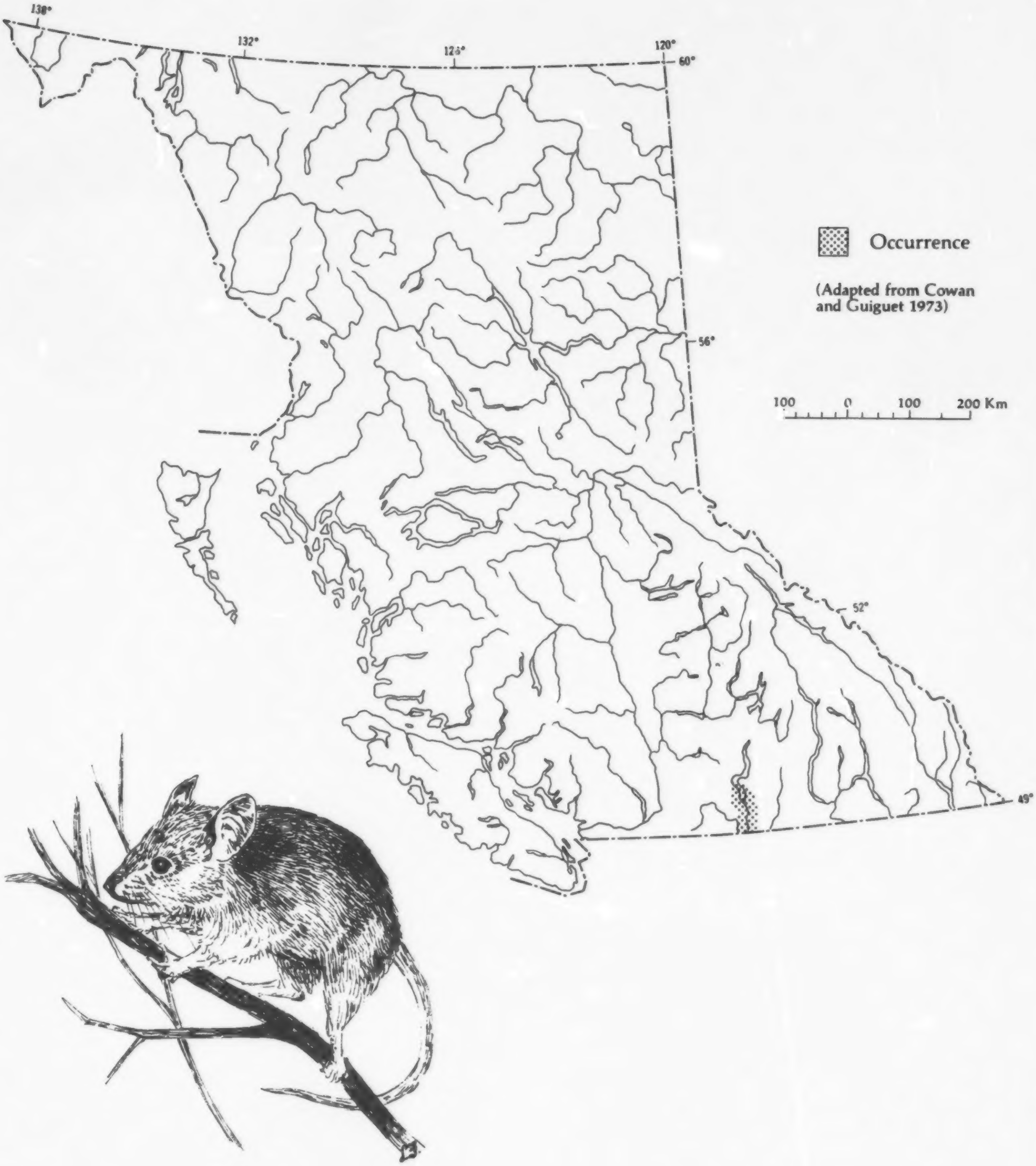
Status

Probably not in jeopardy. Not protected.

Selected References

Banfield 1974; Ingles 1965; Pearson 1960; Webster and Jones 1982.

Western Harvest Mouse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(Adapted from Cowan and Guiguet 1973)

Deer Mouse
PEMA
Peromyscus maniculatus (Wagner)
[White-footed Mouse]

Distribution, Seasonality and Abundance

Occur throughout the province in habitats ranging from subalpine to arid to coastal. Most abundant at lower elevations, being replaced by Red-backed Voles in higher areas. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Broad range of habitats.

SPECIFIC HABITAT ELEMENTS: Nest in a variety of dry sites with nearby escape cover and available nesting material such as sphagnum. Nesting sites include hollow logs, grass clumps, rocks, or a shallow burrow dug by themselves or another species.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in practically any available habitat including forested habitats, southern and boreal bunchgrass steppe, subalpine wet meadows, shrub-dominated habitats and man-influenced habitats. Prefer early successional stages and may prefer a dry forest floor. Will forage in human habitations, coastal beaches, riparian inclusions, and clearcuts. Seldom occur in low, wet habitats.

SPECIFIC HABITAT ELEMENTS: Omnivorous. Arthropods and berries are important in the summer diet and seeds of annuals and perennials are stored for winter use. Arthropods are also used in winter and fungi are eaten all year.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: May utilize diurnal nests in conifer trees. Require escape cover such as a herbaceous or shrub layer, forest litter, trees, brush piles, rocks, stumps, logs, and burrows.

Territory/Home Range

Home range sizes are the same in summer and winter but Deer Mice are territorial only during the summer. Changes in aggressiveness linked to changes in breeding condition. In an Oregon study, 1.9 ha was the average male home range size with 1.4 ha for females (Hooven 1958).

Activity and Movement Patterns

Nocturnal, and may be active all year, spending active periods during the winter on top of the snow rather than in tunnels. Can go into torpor. Most dispersal takes place in the spring when territories are being established.

Status

Not in jeopardy. Not protected.

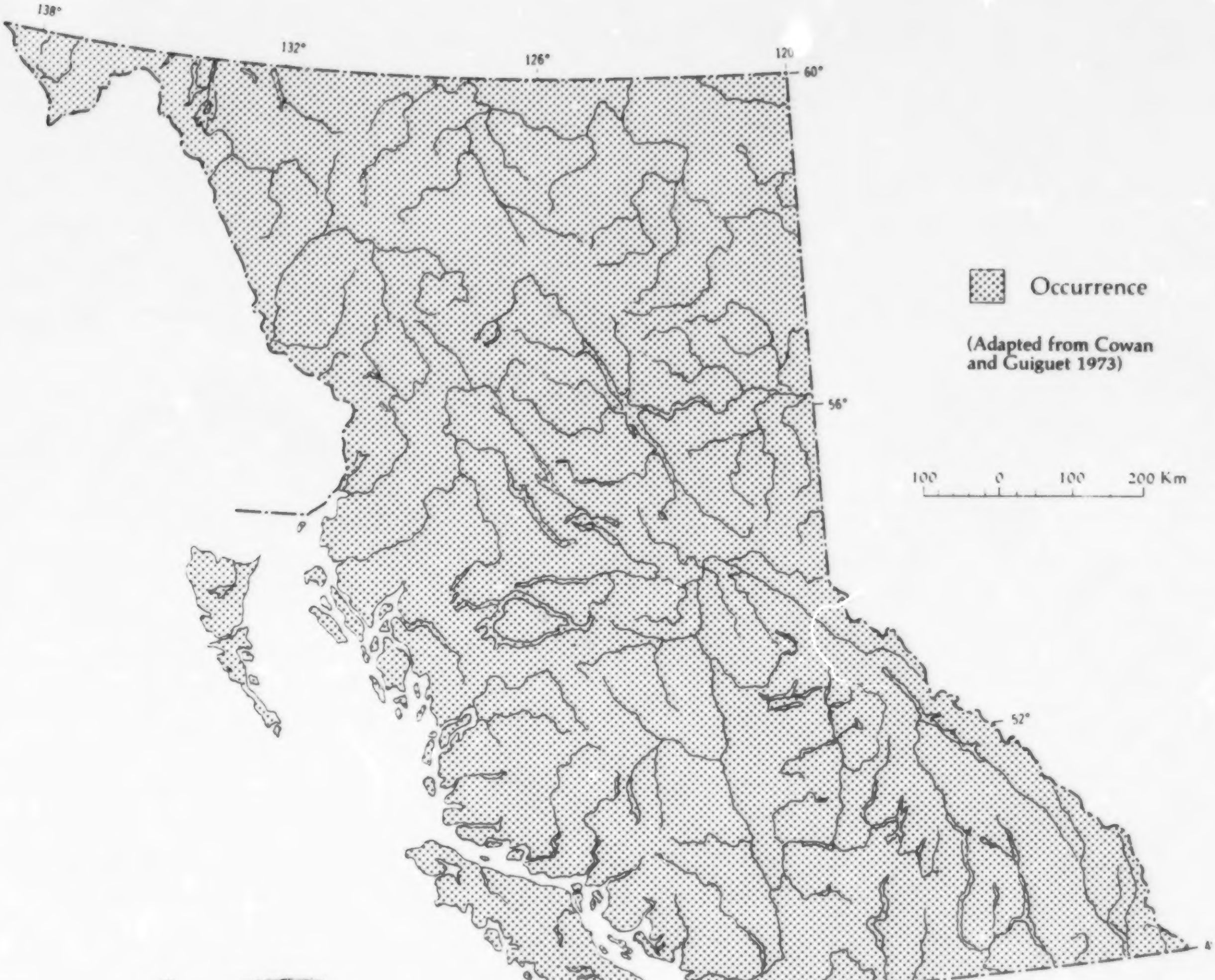
Other

Feed on Douglas-fir seed, making reforestation difficult. Their presence can modify the regeneration pattern of forests so that deciduous rather th[illegible] Douglas-fir forests follow burns; however, may [illegible] important in the establishment of mycorrhizal-forming fungi beneficial to coniferous forests (Maser *et al.* 1978).

Selected References

Banfield 1974; King 1968; Maser *et al.* 1981; Sadlier 1974; Wirtz and Pearson 1960.

Deer Mouse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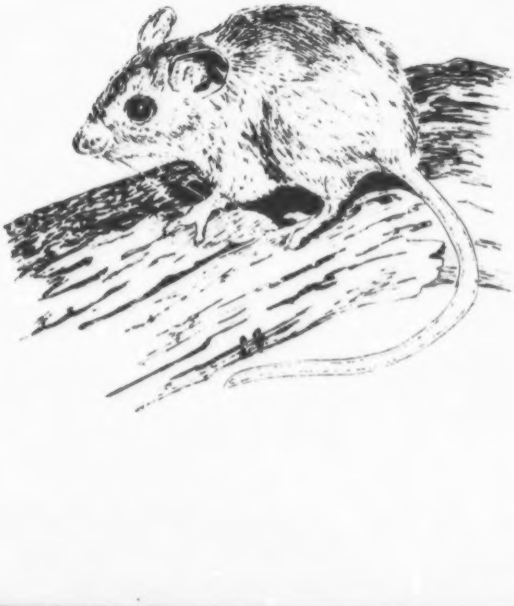


Bushy-tailed Woodrat
NECI
Neotoma cinerea (Ord)
[Bushy-tailed Wood Rat,
Pack Rat]

Distribution, Seasonality and Abundance

Distributed in a wide range of elevations from sea level to high mountains on the mainland of the province. Yearlong resident. Common in British Columbia.

Habitat Requirements - Reproduction

HABITAT CLASSES: Found in conifer-dominated habitats.

SPECIFIC HABITAT ELEMENTS: Prefer to nest in rocky areas such as cliffs, caves, rock outcroppings, and talus. Where rocky habitats are scarce, will nest in trees or buildings. Tree nests may be located inside cavities or outside the tree on branches 4.6 to 15 m high (Maser *et al.* 1981). Nests often constructed of piles of litter, dung, bones and other objects.

Habitat Requirements - Feeding

HABITAT CLASSES: Found in conifer-dominated habitats. Prefer early successional stages and have been found in logged areas of coastal forest.

SPECIFIC HABITAT ELEMENTS: Primarily vegetarian. Diet of forbs, tree and shrub foliage, fungi, fruits, berries, seeds, and some insects and carrion. Willow is a preferred plant food but will also eat conifer twigs. Cache food for winter use.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use storage areas either in the open or in sheltered places such as rock clefts or the base of a tree to pile sticks and debris. Utilize nests for resting in the day. Prefer rocky areas for escape cover.

Territory/Home Range

Strongly territorial. Remain close to nest year-round.

Activity and Movement Patterns

Primarily nocturnal. Active all year, but spend the winter below the snowpack. Dispersal of young occurs in autumn.

Status

Probably not in jeopardy. Not protected.

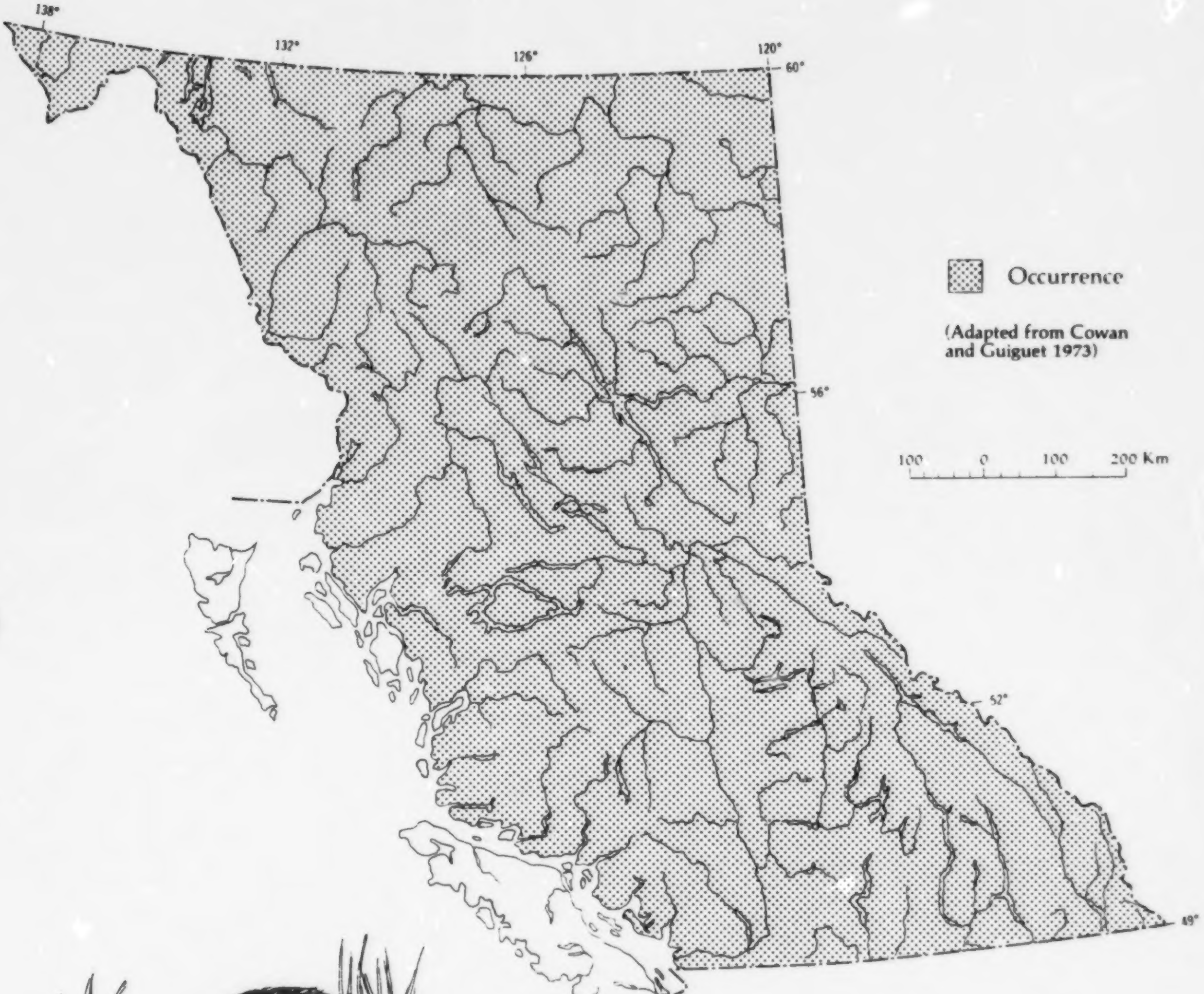
Other

Bushy-tailed Woodrats are primarily a rock-dwelling animal but they will readily take up residence in a manmade structure. Population size is limited more by nest site availability than food.

Selected References

Banfield 1974; Dalquest 1948; Escherich 1981; Harestad 1983; Ingles 1965.

Bushy-tailed Woodrat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(Adapted from Cowan and Guiguet 1973)

Southern Red-backed Vole
CLGA
Clethrionomys gapperi (Vigors)
[Gapper's Red-backed Vole, Boreal Redback Vole]

Distribution, Seasonality and Abundance

Common in appropriate habitat and distributed throughout most of mainland of the province except in extreme northern portions where it is replaced by closely related species Northern Red-backed Vole. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Mesic habitats in coniferous, deciduous, and mixed forests with abundant litter.

SPECIFIC HABITAT ELEMENTS: Nest in hidden areas under the roots of stumps, fallen logs, brush piles, abandoned holes, nests of other small mammals, in tree cavities, or the crotch of a branch. A nest has been found in an abandoned crow's nest.

Habitat Requirements - Feeding

HABITAT CLASSES: Occur in cool, moist forested habitats, typically boreal, montane habitats. At higher elevations, may be found in subalpine wet meadows. Feed in grassy openings and areas of abundant forest litter with mossy rocks, logs, and tree roots.

SPECIFIC HABITAT ELEMENTS: Omnivorous. Spring and summer diet consists mainly of berries, new shoots, and petioles of graminoids, forbs, and shrubs. Fall and winter diet of seeds, lichens, fungi, insects, over-wintering fruits, and shrubs. Do not store food.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Do not construct runways but will use those of other species. Utilize fallen logs, stumps, trees, and brush piles for escape cover. Spherical nests, constructed from vegetation, are used for resting.

Territory/Home Range

Overlapping home ranges vary in size from summer to winter. Summer home range size is approximately 1.5 ha and winter size is 0.24 ha (Chan 1982).

Activity and Movement Patterns

Primarily nocturnal but may be seen during the day. Active throughout the year.

Status

Not in jeopardy. Not protected.

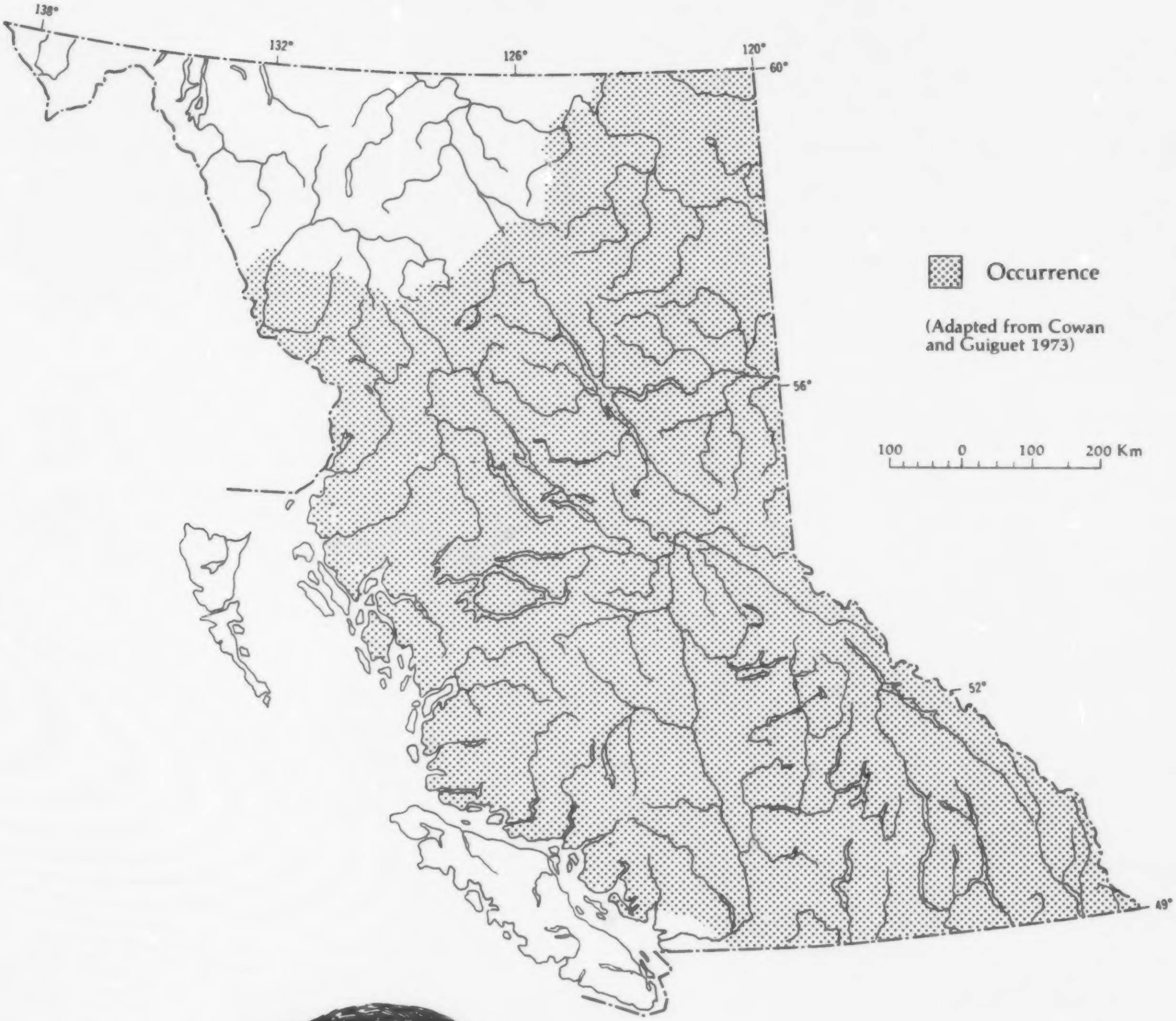
Other

An important disperser of mycorrhizal-forming fungi (Maser *et al.* 1978).

Selected References

Banfield 1974; Butsch 1954; Chan 1982; Merritt 1981.

Southern Red-backed Vole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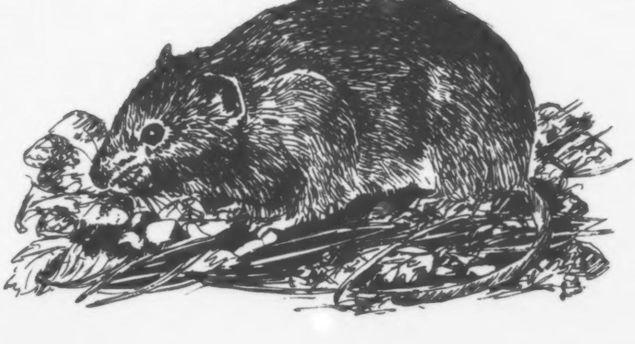


Heather Vole
PHIN
Phenacomys intermedius Merriam
[Mountain Heather-vole]

Distribution, Seasonality and Abundance

Found in central and southern British Columbia, the mountains of the extreme south coast, and the area around the Rainbow Mountains from the Kimsquit to Lac la Hache. Thought to be uncommon within range (Foster 1961) but there may be a bias because they are difficult to trap. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Wide range of dry habitats; typically found in forests such as Douglas-fir -lodgepole pine and Engelmann spruce - subalpine fir. Also occur in lowland and subalpine meadows.

SPECIFIC HABITAT ELEMENTS: Young are born in short burrows under a log, root, stump, or at the base of a shrub.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; preference for forested areas with abundant fallen timber.

SPECIFIC HABITAT ELEMENTS: Summer diet of graminoids, forbs, shrub foliage, kinnikinnick leaves, berries, and seeds. In winter, feed on bark and twigs of shrubs, and lichen. Store large quantities of food and then stay in their burrows until food stores depleted.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Winter nests are a hollow sphere of twigs and lichens on the ground under cover of shrubs or rocks. Tunnels under the snow radiate out from the nest site. Summer nests are constructed 7-15 cm underground.

Habitat Requirements - Pattern

Nests are located near water and foraging areas.

Territory/Home Range

Solitary during the summer. Nest in family groups in the winter.

Activity and Movement Patterns

Active day and night but most active at twilight. Do not hibernate.

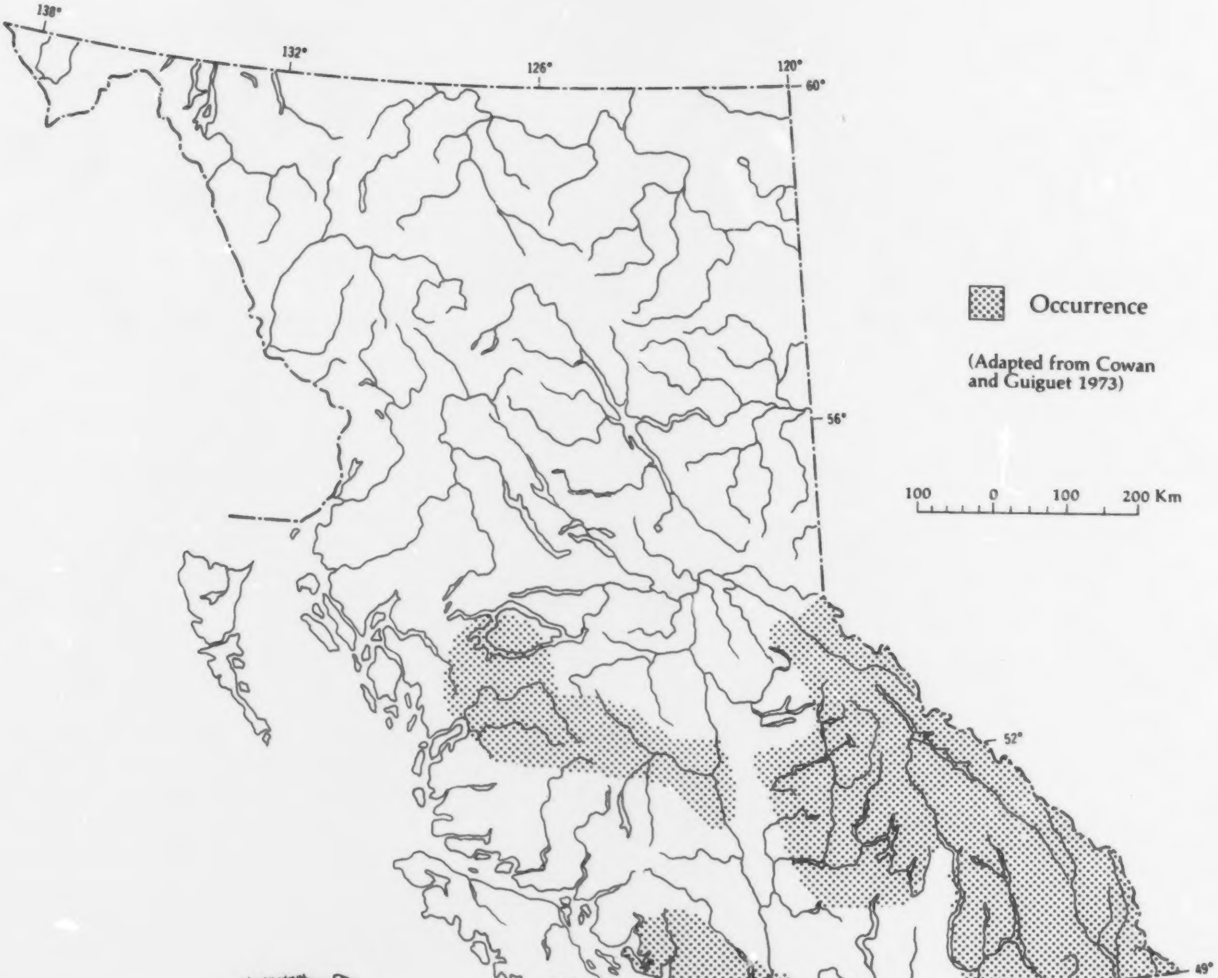
Status

Probably not in jeopardy. Not protected.

Selected References

Banfield 1974; Edwards 1955; Foster 1961; Innes and Millar 1982; Kritzman 1977; Shaw 1924.

Heather Vole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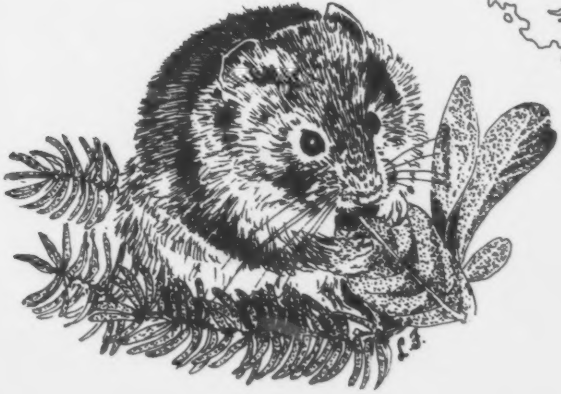


Meadow Vole
MIPE
Microtus pennsylvanicus (Ord)

Distribution, Seasonality and Abundance

Distributed throughout the province at lower elevations, east of the Coast Mountains. Abundant in British Columbia. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Moist areas with grass-like vegetation within a broad range of habitats including wetlands and lowland wet meadows. Common in Engelmann spruce - subalpine fir forests and birch-willow scrub/parkland.

SPECIFIC HABITAT ELEMENTS: Nest is usually a ball of grass in abandoned burrows, grassy tussocks, rocks, or under logs or boards. Nest under the snow in winter.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; utilize streambanks, swampy areas, ponds, sedge meadows, lake shore with adequate cover, roadside ditches with grass and weeds, and grassy forest openings. May swim to grassy tussocks near the edge of a pond to feed.

SPECIFIC HABITAT ELEMENTS: Almost the entire diet is succulent greens (grasses, forbs). In the winter, eat seeds, roots, bulbs, and bark. Store seeds and tubers for winter use.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require herbaceous layer as escape cover. Make runways in meadows and under snow.

Territory/Home Range

May live in dense colonies. Defend small territory around their nest. Home range is between 0.03 and 0.09 ha (Banfield 1974).

Activity and Movement Patterns

Main periods of activity after dawn and before sunset. Active all winter.

Status

Probably not in jeopardy. Not protected.

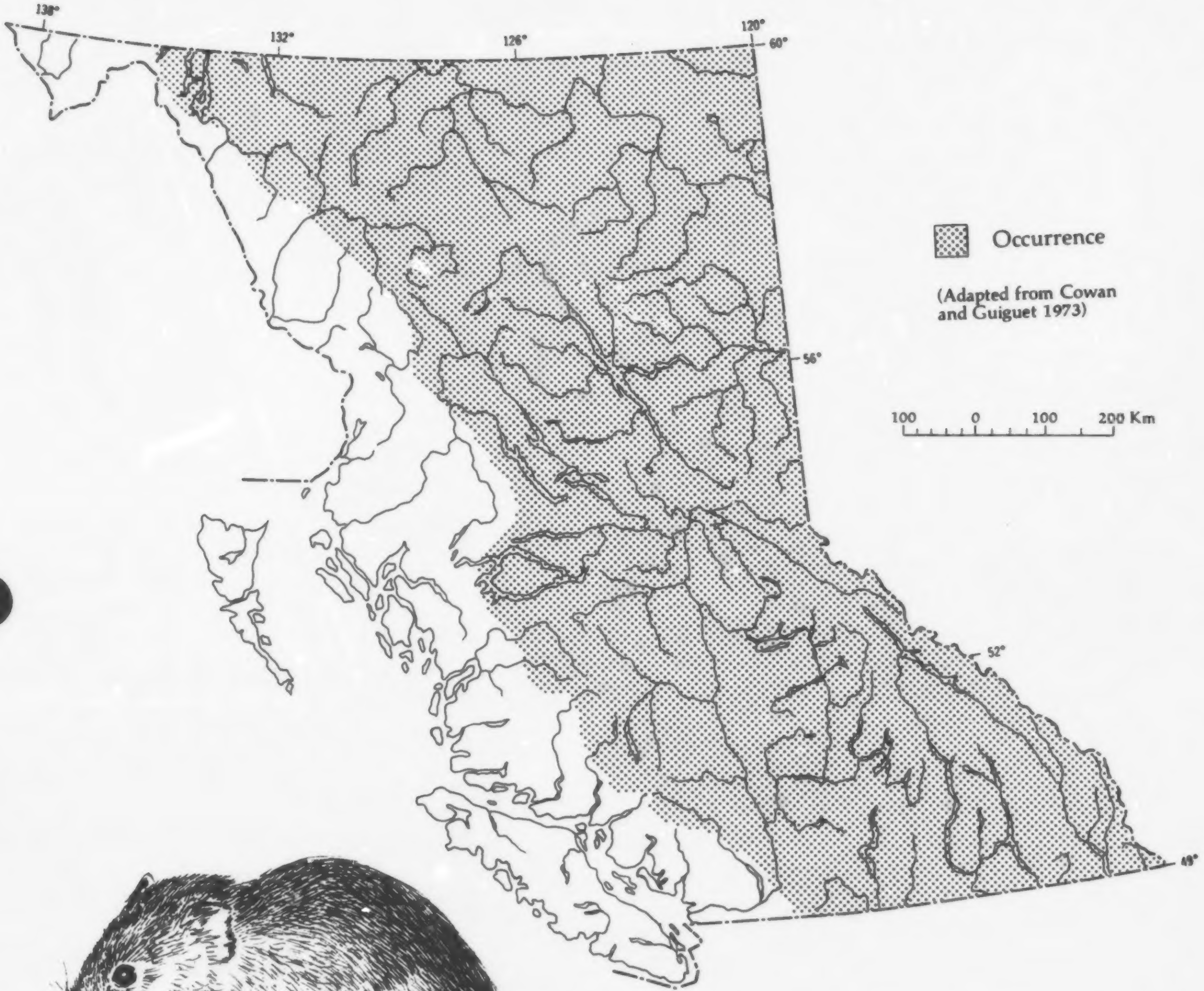
Other

Their runways are used by shrews and Heather Voles. Considered serious agricultural pests. Damage grain crops and girdle fruit trees and conifer seedlings. Population size is cyclical with a 3- to 4-year periodicity.

Selected References

Banfield 1974; Getz 1961; Kritzman 1977.

Meadow Vole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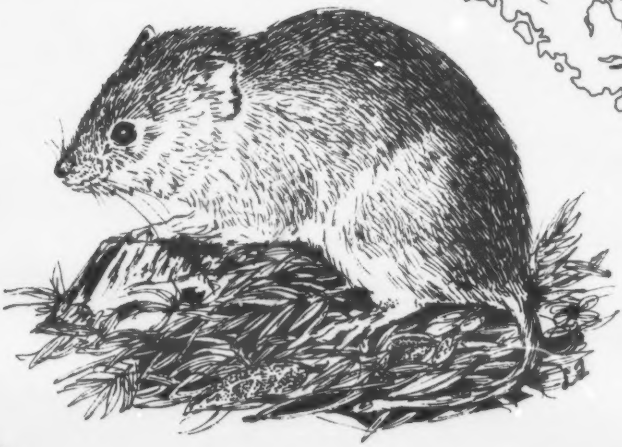


Montane Vole
MIMO
Microtus montanus (Peale)
[Mountain Vole]

Distribution, Seasonality and Abundance

Occurs in the Okanagan, Kettle, and Thompson valleys north to the Cariboo. Abundance in the province is not known. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Occur in sagebrush steppe and southern bunchgrass steppe. May also be found in orchards. Usually found at higher elevations than other voles.

SPECIFIC HABITAT ELEMENTS: Young are born in nests on the ground under cover such as a log, or in shallow surface burrows. May also nest under snow.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements.

SPECIFIC HABITAT ELEMENTS: Feed on leaves and stems of forbs and grasses. Often forage in dense cover of grasses, reeds, or sedges near water.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Rest in shallow burrows or in nests under cover such as a log or rock. Require herbaceous layer as escape cover.

Territory/Home Range

Size of territory, if any, unknown. Mean home range 0.1 ha (Verner and Boss 1980).

Activity and Movement Patterns

Active day and night throughout the year.

Status

Not in jeopardy. Not protected.

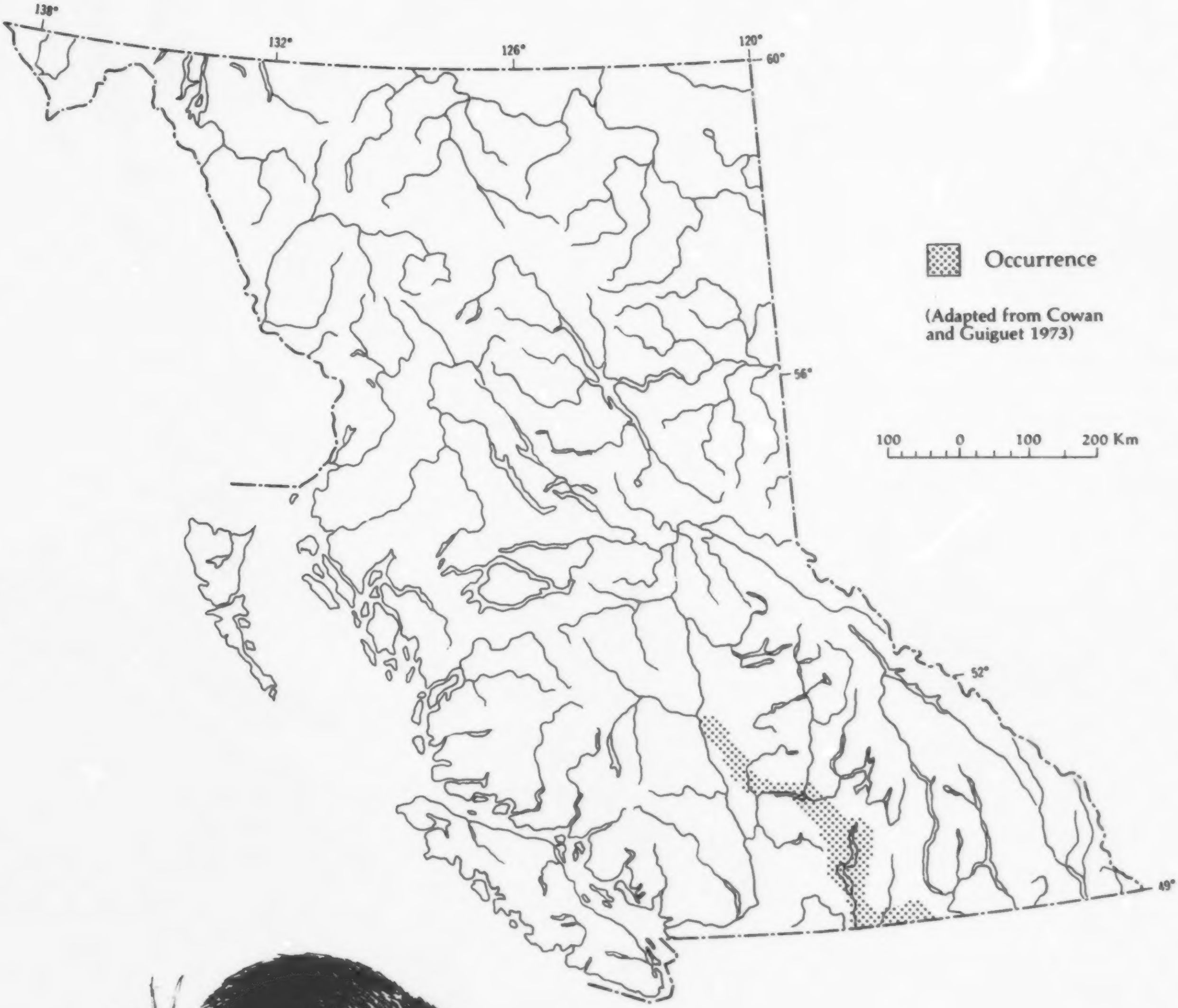
Other

Usually associated with Harvest Mice, Vagrant Shrews, and Muskrats. Population size cycles with a periodicity of 3 to 4 years.

Selected References

Anderson 1959; Banfield 1974; Ingles 1965.

Montane Vole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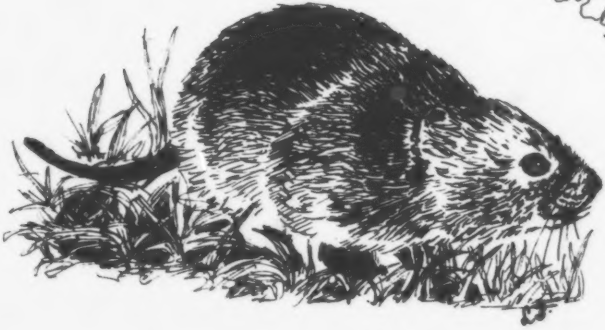


Long-tailed Vole
MILO
Microtus longicaudis (Merriam)

Distribution, Seasonality and Abundance

Distributed along the coast, on some islands, Okanagan/Manning Park area, and the Rocky Mountains, at elevations from sea level to 1200 m. Common native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Reproduce in a variety of habitats but seem to prefer lowland meadows, subalpine meadows, and wetland habitats.

SPECIFIC HABITAT ELEMENTS: Young are born in nests underground, under logs, or sometimes in rotten logs.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage along stream edges, lakesides, ponds, swamps. riparian inclusions, rocky mountainsides, and grassy openings in forested habitats.

SPECIFIC HABITAT ELEMENTS: Diet primarily of green vegetation (grasses, forbs, shrub leaves, etc.). May eat hypogeous fungi.

Habitat Requirements - Special Needs:

SPECIFIC HABITAT ELEMENTS: Require escape cover such as a dense herbaceous layer. Construct tunnels under snow.

Territory/Home Range

No information available on territoriality. Home range in California varied from 0.1 to 4 ha (average 0.2 ha) (Jenkins 1948). In British Columbia, up to 30-40/ha have been reported on recently logged areas of lodgepole pine.

Activity and Movement Patterns

Generally diurnal and active all year long.

Status

Not in jeopardy. Not protected.

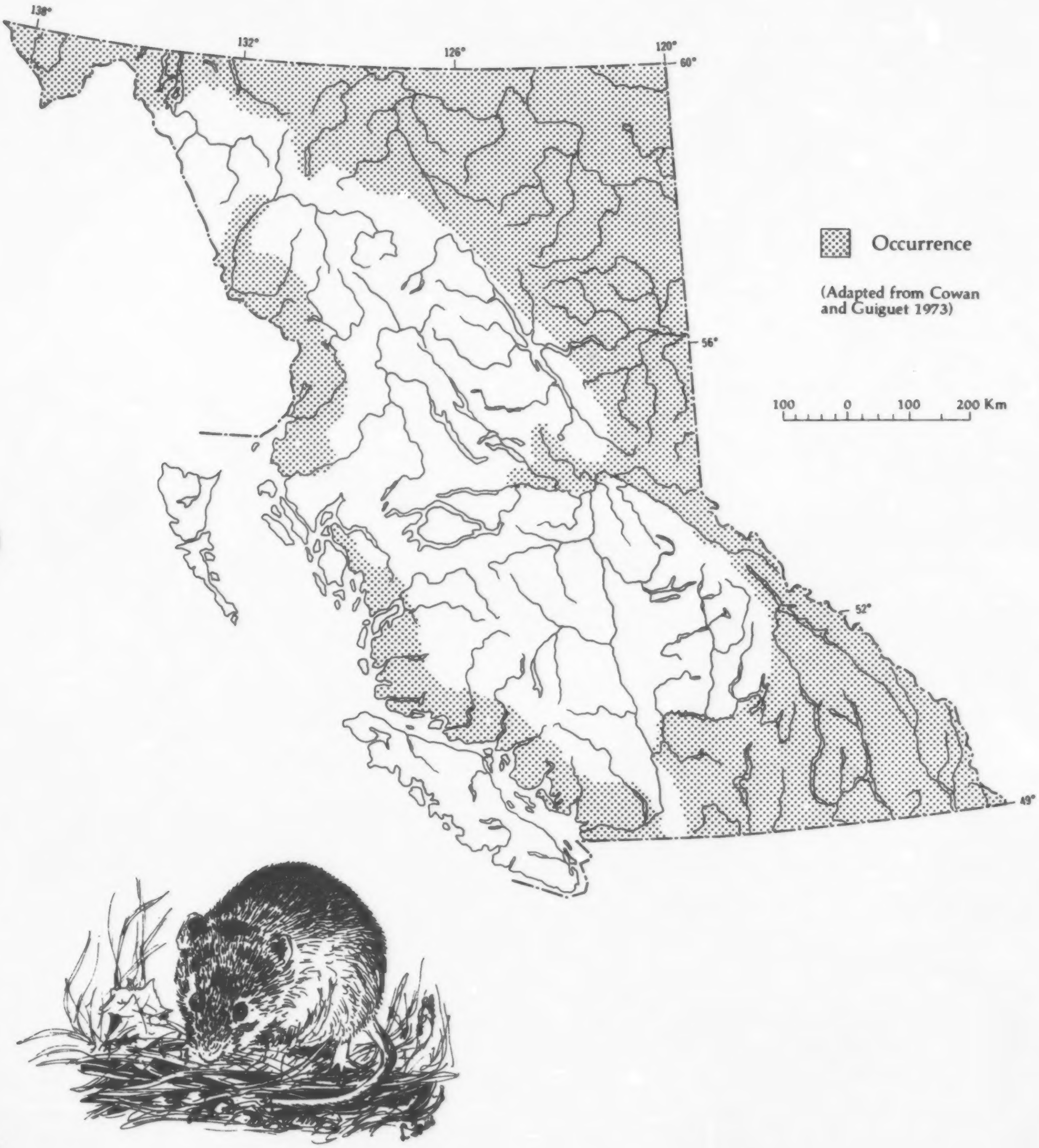
Other

Unlike other voles, Long-tailed Voles do not make tunnels and trails in meadows. Population size is cyclical with a 3- to 4-year periodicity.

Selected References

Ingles 1965; Maser *et al.* 1981.

Long-tailed Vole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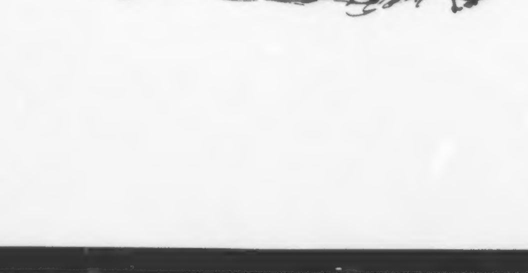


Muskrat
ONZI
Ondatra zibethicus (Linnaeus)

Distribution, Seasonality and Abundance

Native to the mainland, east of the Coast Mountains but introduced to Vancouver Island (1923), and to Graham and Denman islands. Abundant yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Wetland/aquatic habitats.

SPECIFIC HABITAT ELEMENTS: Habitat for nesting may be a burrow system in a stream bank or a free-standing nesting house that reaches above the surface of the water. Nesting houses have underwater exit holes and may be 1 m high and 0.5 m in diameter.

Habitat Requirements - Feeding

HABITAT CLASSES: Feed in wetland/aquatic habitats, such as fresh emergent wetlands, ponds, and slow permanent riverine habitats. Feed in marshes, lakes, ponds, intermittent and permanent streams, highway culverts, roadside, and irrigation ditches. Prefer still or slightly moving water containing vegetation. Avoid areas of deep water as this precludes submerged vegetation.

SPECIFIC HABITAT ELEMENTS: Generally vegetarians, although may be carnivorous or cannibalistic under extreme conditions. Staple foods are aquatic emergents, particularly cattails and bulrush. In winter, diet changes to submerged vegetation. May have feeding houses or platforms that are smaller versions of their nesting houses.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Stable water levels are desirable, particularly where Muskrats use burrows rather than floating houses. Ideally, water should be 1-2 m deep so that it will not freeze to the bottom in winter.

Territory/Home Range

Live in family units and defend nest area. Home ranges occasionally as large as 200 ha (Verner and Boss 1980).

Activity and Movement Patterns

Muskrats are especially active at twilight and during the night. Active all year. In autumn, may abandon summer residences in shallow marshes and ponds in favour of areas with deeper water. Juvenile dispersal occurs in the spring. Average daily movement radius is 150 m in the northern United States, but increases to 300 m in the Mackenzie Delta where vegetation is scarce.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

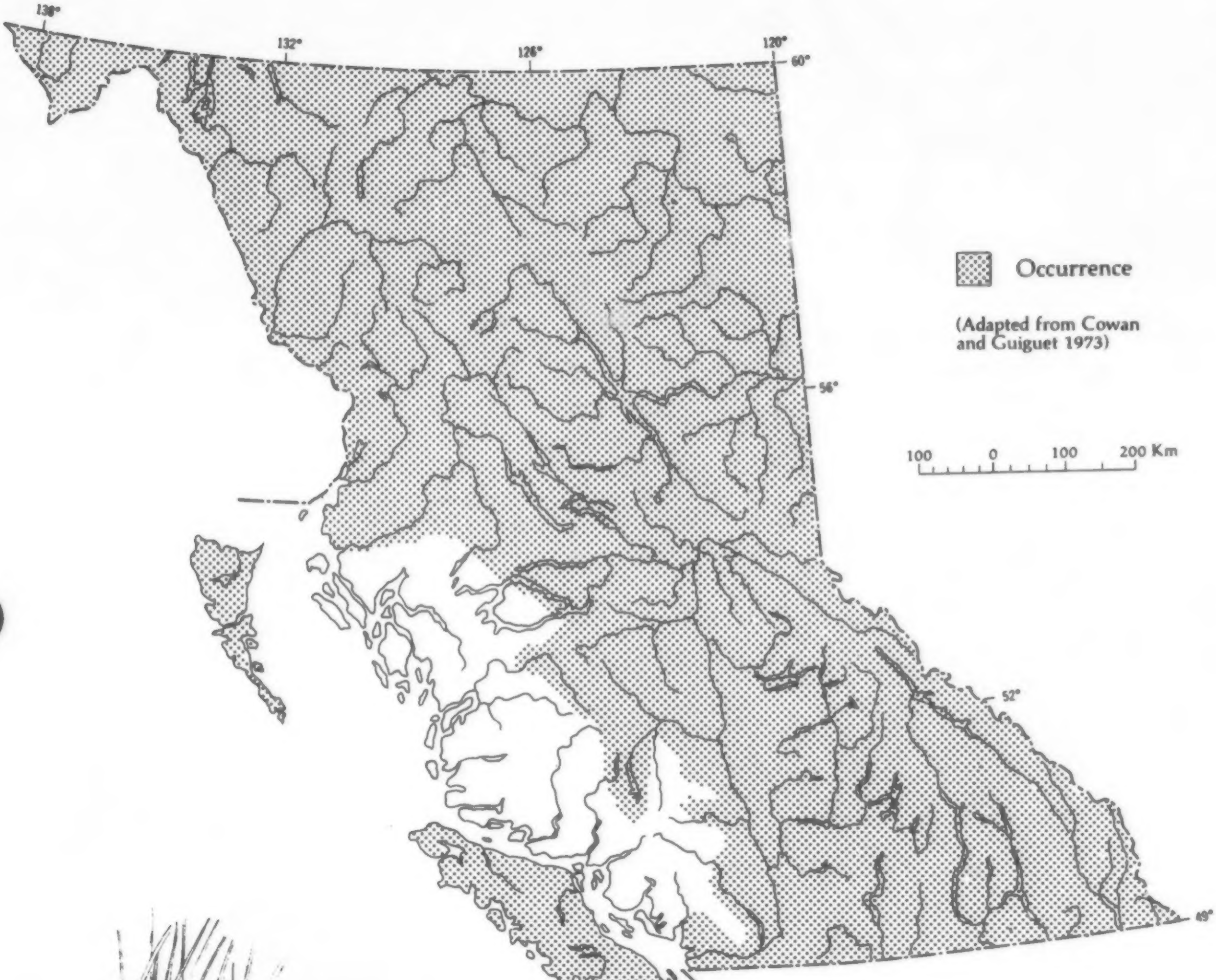
Other

Although the Muskrat is preyed upon by a number of species (large carnivores, raptors, otter, Mink), predation probably has little effect on population densities. In a few areas, population may be locally controlled by Mink.

Selected References

Jackson *et al.* 1979; Maser *et al.* 1981; Perry 1982.

Muskrat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(Adapted from Cowan and Guiguet 1973)

Northern Bog Lemming
SYBO
Synaptomys borealis (Richardson)
[Northern Bog-lemming]

Distribution, Seasonality and Abundance

Distributed in the southern Rockies and Selkirk Ranges, northern interior, Coastal Range, the Princeton/Okanagan area, and a few islands. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Characteristically found in black spruce-tamarack bogs, sphagnum bogs, and alpine/ subalpine wet meadows, but also occur in other habitats such as sedge fens, sagebrush steppe, and boreal white spruce forests.

SPECIFIC HABITAT ELEMENTS: Young are born in nests in underground burrows.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements.

SPECIFIC HABITAT ELEMENTS: Diet includes graminoids and the leaves of some forbs. May occur in willow thickets.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: In the winter, may construct a surface nest in higher, drier areas. These nests are often constructed of sedges and may be a dome, 15-20 cm in diameter. Use runways through herbaceous layer as escape cover.

Activity and Movement Patterns

Active during most of the 24-hour period and during winter.

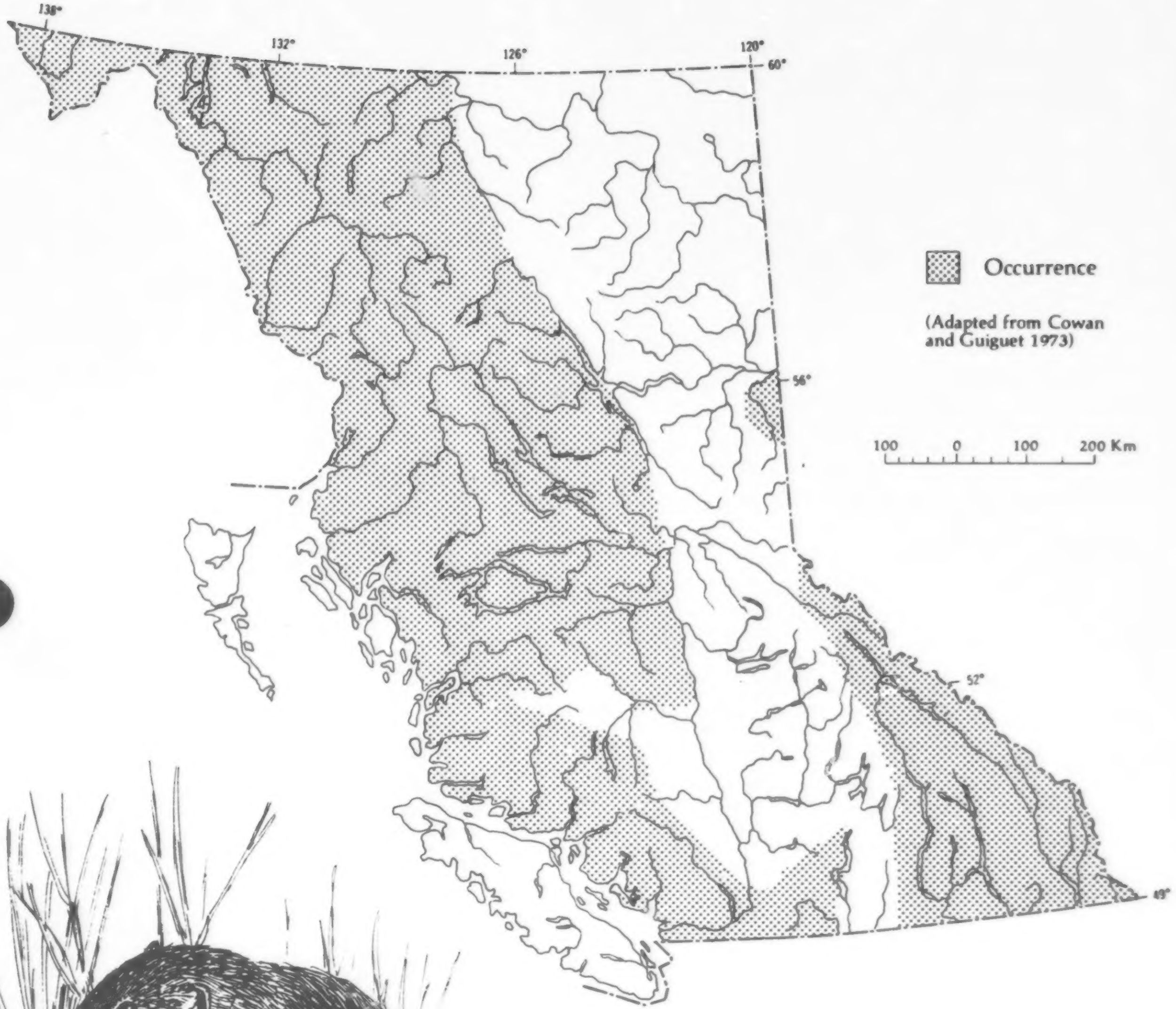
Status

Probably not in jeopardy. Not protected.

Selected References

Banfield 1974; Cowan and Guiguet 1973.

Northern Bog Lemming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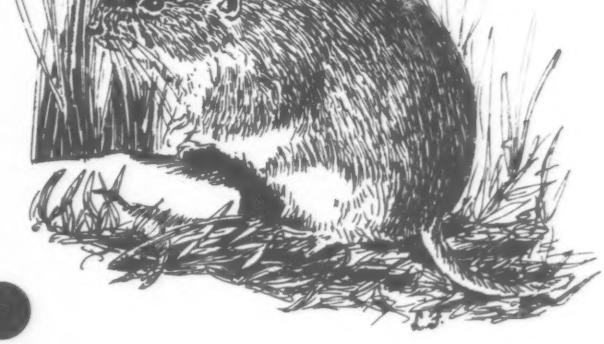


Norway Rat
RANO
Rattus norvegicus (Berkenhout)

Distribution, Seasonality and Abundance

Distributed in cities, towns, and more southerly rural areas. Does not occur in the northern interior or Peace River area. Some feral populations on Vancouver Island. Yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Man-influenced habitats.

SPECIFIC HABITAT ELEMENTS: Usually nests in and around buildings but also burrows and may dig extensive tunnel systems with nesting activities.

Habitat Requirements - Feeding

HABITAT CLASSES: Man-influenced habitats. Feed in a variety of places including garbage dumps, sewage disposal systems, warehouses, barns, and areas where grain is stored. May also forage in coastal and riparian areas.

SPECIFIC HABITAT ELEMENTS: Omnivorous.

Territory/Home Range

Colonial. Relatively sedentary and generally occupy home ranges approximately 8-20 m in diameter (Banfield 1974).

Activity and Movement Patterns

Active all year and at any time of the day and night.

Status

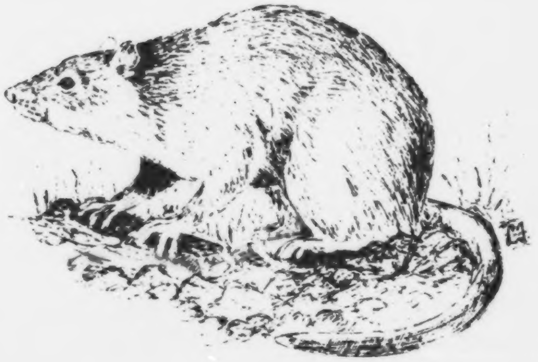
Not in jeopardy. Not protected.

Other

Introduced. Outcompete the black rat where the two species come in contact. Damage human food stores and property. May serve as a reservoir and source of infection for a number of serious human diseases.

Selected References

Banfield 1974; Cowan and Guiguet 1973.



House Mouse
MUMU
Mus musculus (Linnaeus)

Distribution, Seasonality and Abundance

Common rodent throughout the province in and around buildings but will also live in fields and brush where climate permits. Yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Usually nest in man-influenced habitats.

SPECIFIC HABITAT ELEMENTS: Make nests out of soft materials such as rags, cotton, wool, or paper. These nests are located in places such as wood piles, walls, upholstered furniture, dresser drawers, or piles of paper.

Habitat Requirements - Feeding

HABITAT CLASSES: Usually feed in man-influenced habitats, especially around human habitation, but may also forage in wetland habitats and cultivated fields.

SPECIFIC HABITAT ELEMENTS: Omnivorous. Diet includes seeds, grains, fruit, vegetables, cheese, and meat.

Territory/Home Range

Colonial. Once established, usually remain within a small area, seldom travelling more than 15 m from their home base.

Activity and Movement Patterns

Primarily nocturnal and active all year. May utilize runways of other small mammals such as voles.

Status

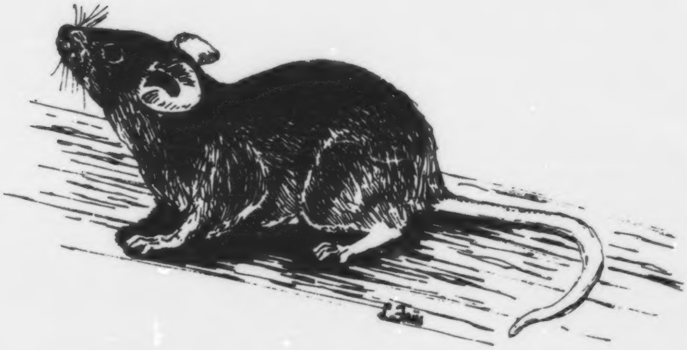
Not in jeopardy. Not protected.

Other

Introduced. Unable to compete successfully with Deer Mice in the wild.

Selected References

Banfield 1974; Berry 1981; Maser *et al.* 1981; Sheppe 1967.



Meadow Jumping Mouse
ZAHU
Zapus hudsonius (Zimmermann)

Distribution, Seasonality and Abundance

Distributed in the northern half of the province and central British Columbia from the Skeena Valley in the north to the Okanagan Valley. Yearlong resident. Common.

Habitat Requirements - Reproduction

HABITAT CLASSES: Preferred habitat is moist grassland such as lowland wet meadows, alpine/subalpine wet meadows, and cultivated fields.

SPECIFIC HABITAT ELEMENTS: Requires adequate herbaceous ground cover. Grass nests constructed in hollow logs, clumps of grass, under planks, or in a depression in the ground.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; prefer early successional stages and may occur along the edges of lakes, ponds, streams, and wooded areas with abundant ground vegetation.

SPECIFIC HABITAT ELEMENTS: Diet primarily of seeds, especially graminoid seeds. Fruits, berries, nuts, fungi, and insects are also eaten, particularly when first emerging from hibernation. Do not store food for winter use.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require adequate herbaceous layer for escape cover. Hibernate for much of the year in nests of leaves or grass either under logs or more typically from 0.3 - 1 m underground in loose clay, wood ash, sand, or road fill. May dig their own burrows or use burrows of other mammals.

Territory/Home Range

Generally solitary. Environment influences the size of home range and terrain determines the shape. In two separate areas, the home range sizes for males averaged 0.17 ha and 1.1 ha and the average home range size for females was 0.15 ha and 0.63 ha (Whitaker 1972).

Activity and Movement Patterns

Meadow Jumping Mice are seen during the day but are most active at night. May move more than other rodents, possibly in search of moist areas during the dry part of summer. Hibernate during the winter.

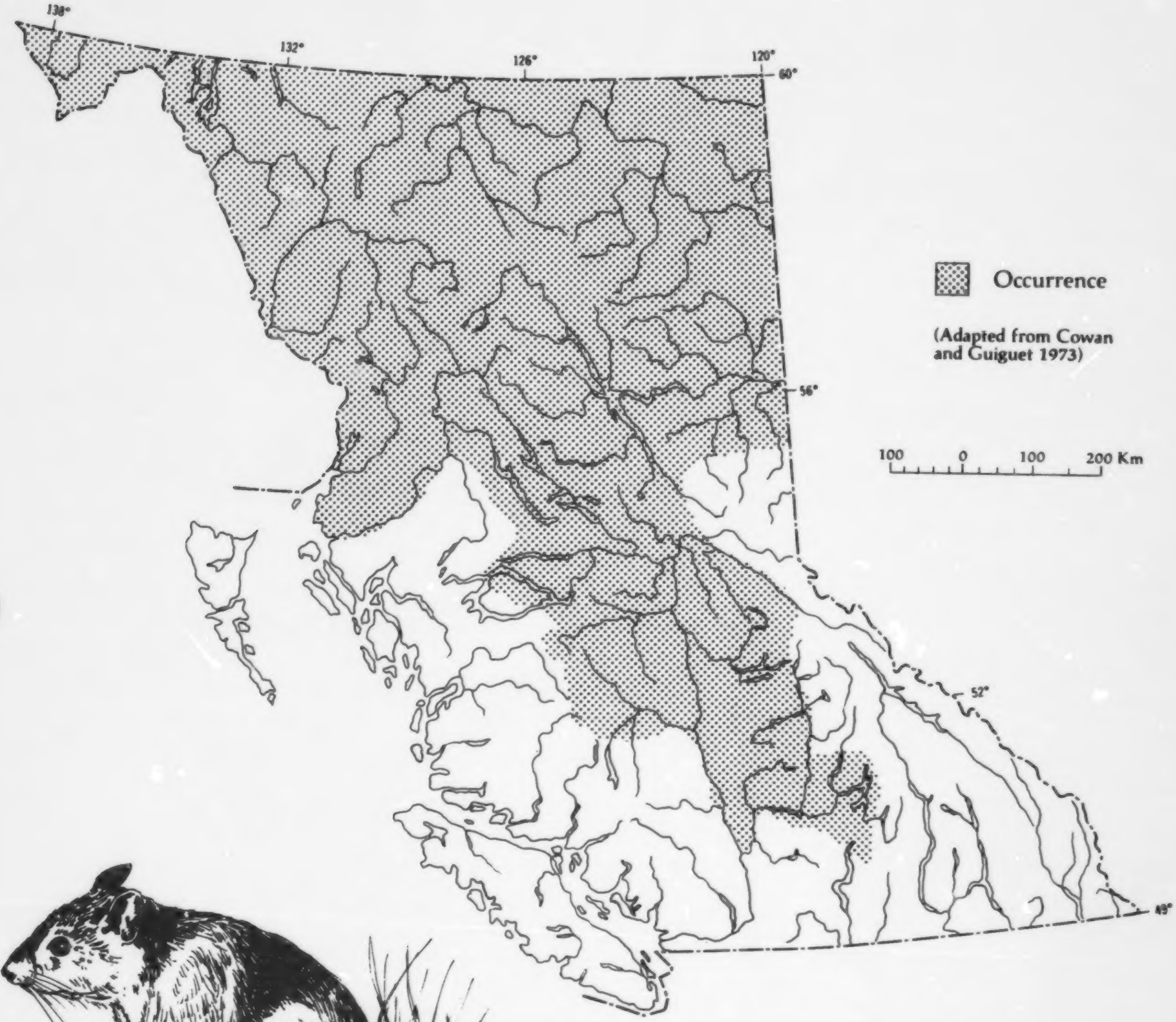
Status

Not in jeopardy. Not protected.

Selected References

Banfield 1974; Jones 1981; Quimby 1951; Whitaker 1972.

Meadow Jumping Mouse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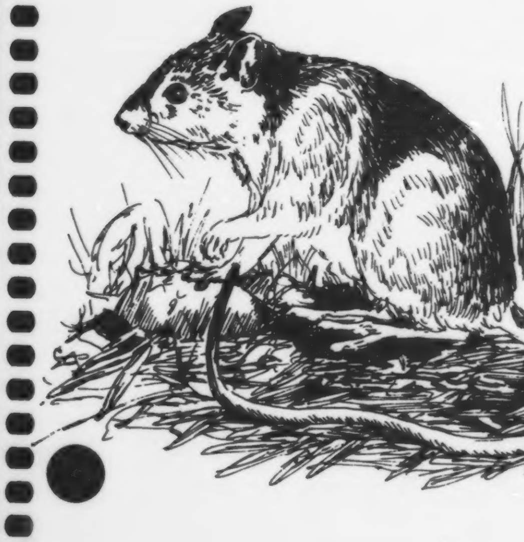


Western Jumping Mouse
ZAPR
Zapus princeps (J. A. Allen)

Distribution, Seasonality and Abundance

Distributed throughout the northern part of the province, southern Rocky Mountain Trench, and central interior. Native yearlong resident. Common in British Columbia in appropriate habitat.

Habitat Requirements - Reproduction

HABITAT CLASSES: Prefers moist habitats, such as wet lowland meadows, alpine/subalpine meadows, and fresh, emergent wetland.

SPECIFIC HABITAT ELEMENTS: Young are born in a nest of woven grasses, usually constructed in shallow depressions among grass clumps or other suitable cover.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; forage in grassy meadows, thickets, riparian inclusions, forest openings, and brushy margins of streams and lakes. Often occur in the vicinity of water.

SPECIFIC HABITAT ELEMENTS: Grass seeds are the main food but also eat other plant material and berries.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require escape cover such as dense herbaceous or shrub layer, thickets, logs, etc. Hibernate in nests 0.3-1 m underground. During the summer, live in nests in shallow burrows or under rocks and logs, emerging in the evening to forage.

Territory/Home Range

Studies in Wyoming and Colorado reported average home range sizes of 0.25 ha for females and 0.3 ha for males. Ranges may extend from 100-400 m along grassy banks and wet areas (Brown 1967; Myers 1969).

Activity and Movement Patterns

Primarily nocturnal. Hibernate from September to late May.

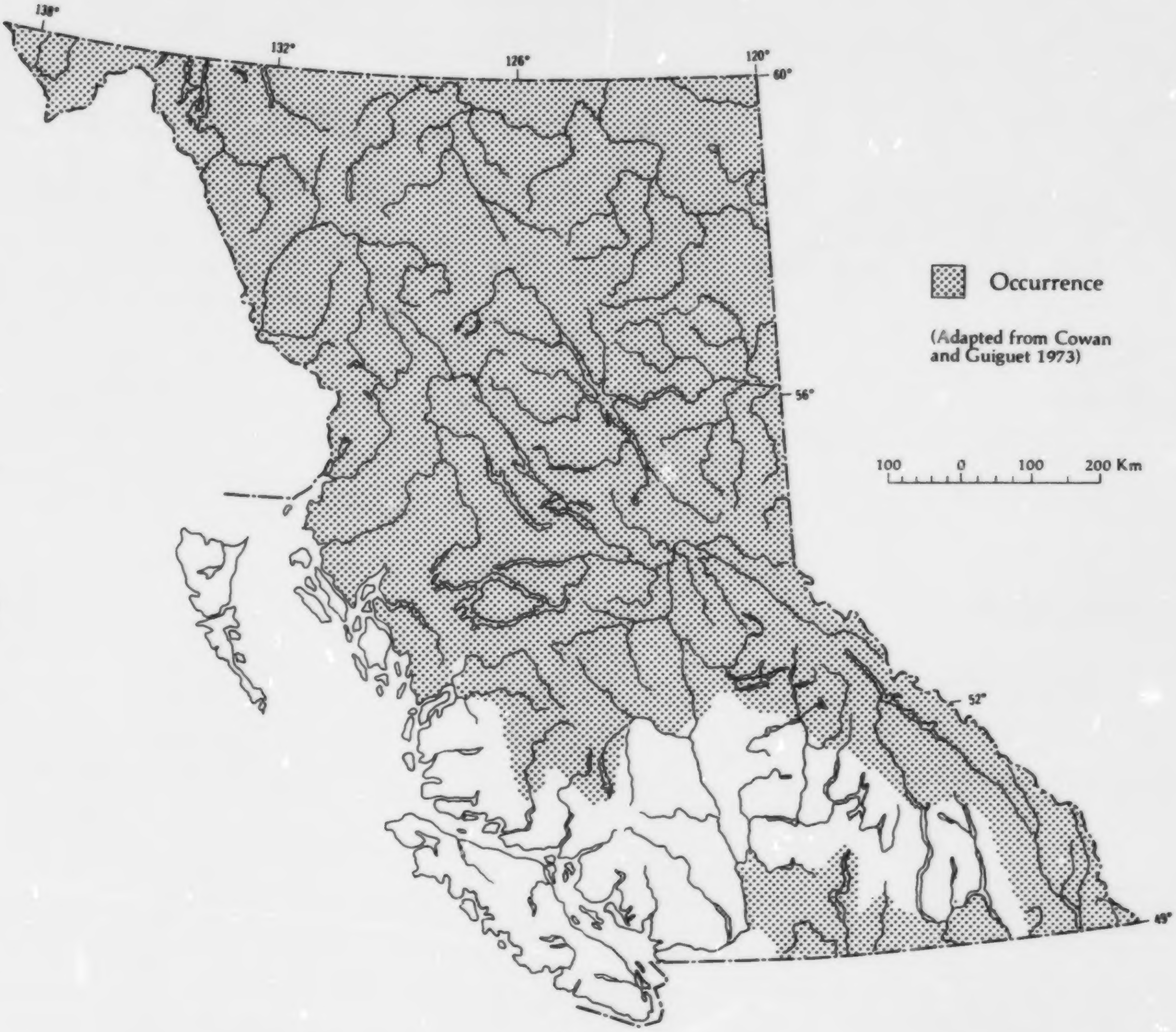
Status

Not in jeopardy. Not protected.

Selected References

Banfield 1974; Brown 1967, 1970; Clark 1971; Jones 1981; Jones *et al.* 1978; Kritzman 1977.

Western Jumping Mouse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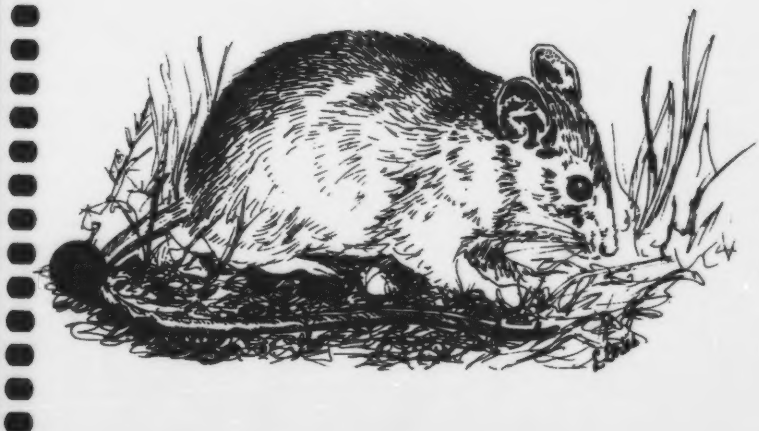


Porcupine
ERDO
Erethizon dorsatum (Linnaeus)
[American Porcupine]

Distribution, Seasonality and Abundance

Distributed throughout most of the mainland of the province in a wide range of elevations. Common native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats and rocky areas.

SPECIFIC HABITAT ELEMENTS: Young are born in dens located in caves, logs, hollow trees, old burrows, dense brush, rock clefts, or the base of coniferous trees with low, concealing branches.

Habitat Requirements - Feeding

HABITAT CLASSES: Winter in forested habitats but may forage in lowland and subalpine wet meadows, riparian areas, greening up clearcuts on the coast and agricultural habitats in spring and summer. Forage on ground or in shrubs and trees.

SPECIFIC HABITAT ELEMENTS: Herbivorous. Spring and summer diet is varied and includes roots, stems, leaves, berries, catkins, seeds, flowers, nuts, water plants, and grass as well as some domestic plants. In the winter, Porcupines feed on the cambium layer of trees, usually at the 'sugar zone', 90-120 cm below the top of the tree. Evergreen needles (especially ponderosa pine), buds, and twigs supplement winter diet.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Prefer dense cover when moving. Movement is in draws and bushy stream beds when in open country. Hollow trees or any concavity with only one entrance serve as escape cover. Utilize limbs of conifer trees for day resting sites. Especially in winter, den in ground shelters such as hollow trees, hollow logs, caves, culverts, rockfalls, and brushpiles. Often a snow tunnel leads to winter den.

Territory/Home Range

Solitary and do not defend a territory. Summer home ranges are larger than winter ranges. In New York State, summer ranges were 13-14 ha while winter ranges averaged 5.4 ha (Woods 1973).

Activity and Movement Patterns

Primarily nocturnal, although may be active during the day in summer. May follow regular paths from dens to favourite feeding areas. Do not hibernate, but are usually not active at temperatures below -18C. Migrations have been known to occur with a shift in food habits.

Status

Not in jeopardy. Not protected.

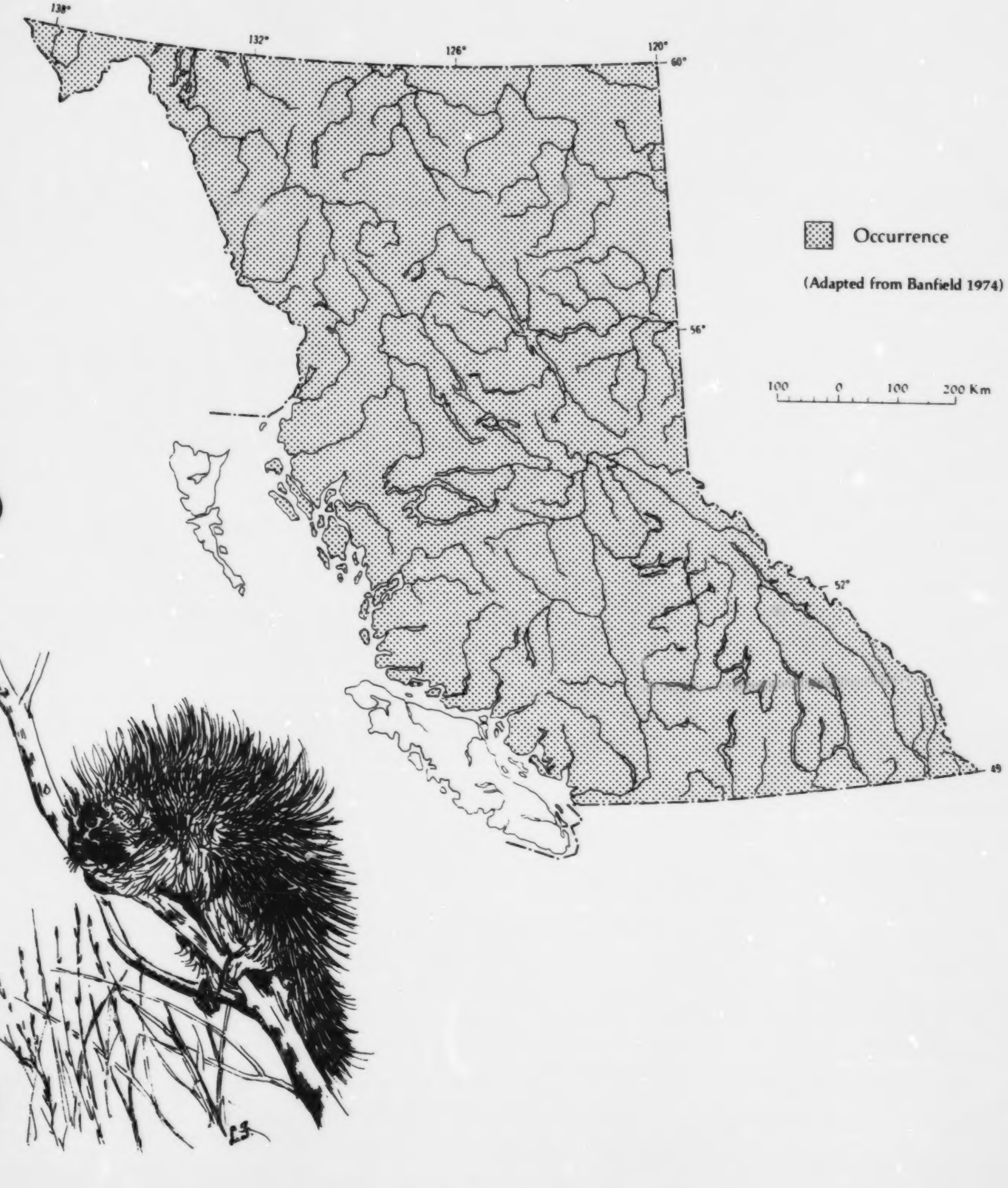
Other

Chief predators are man, Fisher, and Wolverine. Fishers have been successfully introduced to control Porcupine populations (Cook and Hamilton 1957; Powell 1982). Some indication of population cycling with a periodicity of 10 to 12 years (Woods 1973).

Selected References

Dodge 1982; Jennings 1964; Powell 1982; Woods 1973.

Porcupine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(Adapted from Banfield 1974)

Gray Wolf
CALU
Canis lupus (Linnaeus)
[Wolf]

Distribution, Seasonality and Abundance

Distributed from sea level to above timberline throughout most of the province except the Queen Charlottes. Most abundant in northern Vancouver Island and the northern half of the province. Provincial population estimated at 6300 in 1979 (Petticrew and Munro 1979b) and presently exceeding 7500 (F. Tompa, pers. comm.). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Wide variety of habitat classes.

SPECIFIC HABITAT ELEMENTS: Breeding occurs in late February to mid-March. Pups are born in May (average six/litter). Females use dens for parturition and care of young (about 2 months) then den is abandoned. Dens are usually dug in the ground but may also be in a rock crevice, hollow log, or overturned stump. Prefer an elevated site near water and an abundant food supply. Dens may be used for 2 or more years, or several dens may be used during one season.

Habitat Requirements - Feeding

HABITAT CLASSES: Presence of wolves is dependent on the availability of suitable prey rather than habitat class.

SPECIFIC HABITAT ELEMENTS: Food habits vary with habitat. Wolves typically feed on large prey such as deer, Moose, caribou, elk, Mountain Goat, and Bighorn Sheep. In winter, tend to congregate along major rivers, in ungulate winter range. In some areas, such as Wells Gray Park, chief winter prey is Moose. On Vancouver Island, primary prey is Black-tailed Deer, with elk and Beaver as secondary food sources (Scott and Shackleton 1980). In other areas, summer diet is primarily rodents, particularly Beavers. Domestic stock, grouse, waterfowl, spawning fish, and carrion are also eaten.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Rendezvous sites are used in the summer when pups are present, after the den is abandoned. These are areas of about 0.2 ha in semi-open, well-drained areas near water. Prefer habitats with little human disturbance. Rivers or timbered areas are used for travel in the winter depending on snow depth and compaction. Dirt roads and game trails are used as travel corridors in the summer.

Territory/Home Range

Wolves are highly social and almost always live in family groups. Family groups may occupy exclusive home ranges. Home range size varies widely with habitat and prey availability. In Minnesota, home ranges average 130 km^2 while on the tundra of Alaska, ranges are thought to be as large as 1300 km^2 (Mech 1974). Two wolf packs on Vancouver Island utilized 64 and 75 km^2 home range, respectively (Scott 1979). In northern British Columbia, wolf packs use home ranges from 150-400 km^2 (J.P. Elliott, pers. comm.).

Activity and Movement Patterns

During the summer, wolves are primarily nocturnal and activity centres around dens and rendezvous sites. During winter, movements are more extensive and may occur at any time of night or day. Lone wolves travel more than family groups, but all wolves move extensively. A migrating wolf may go as far as 300 km.

Status

Not in jeopardy. Protected as big game and a furbearer under the British Columbia Wildlife Act (1982).

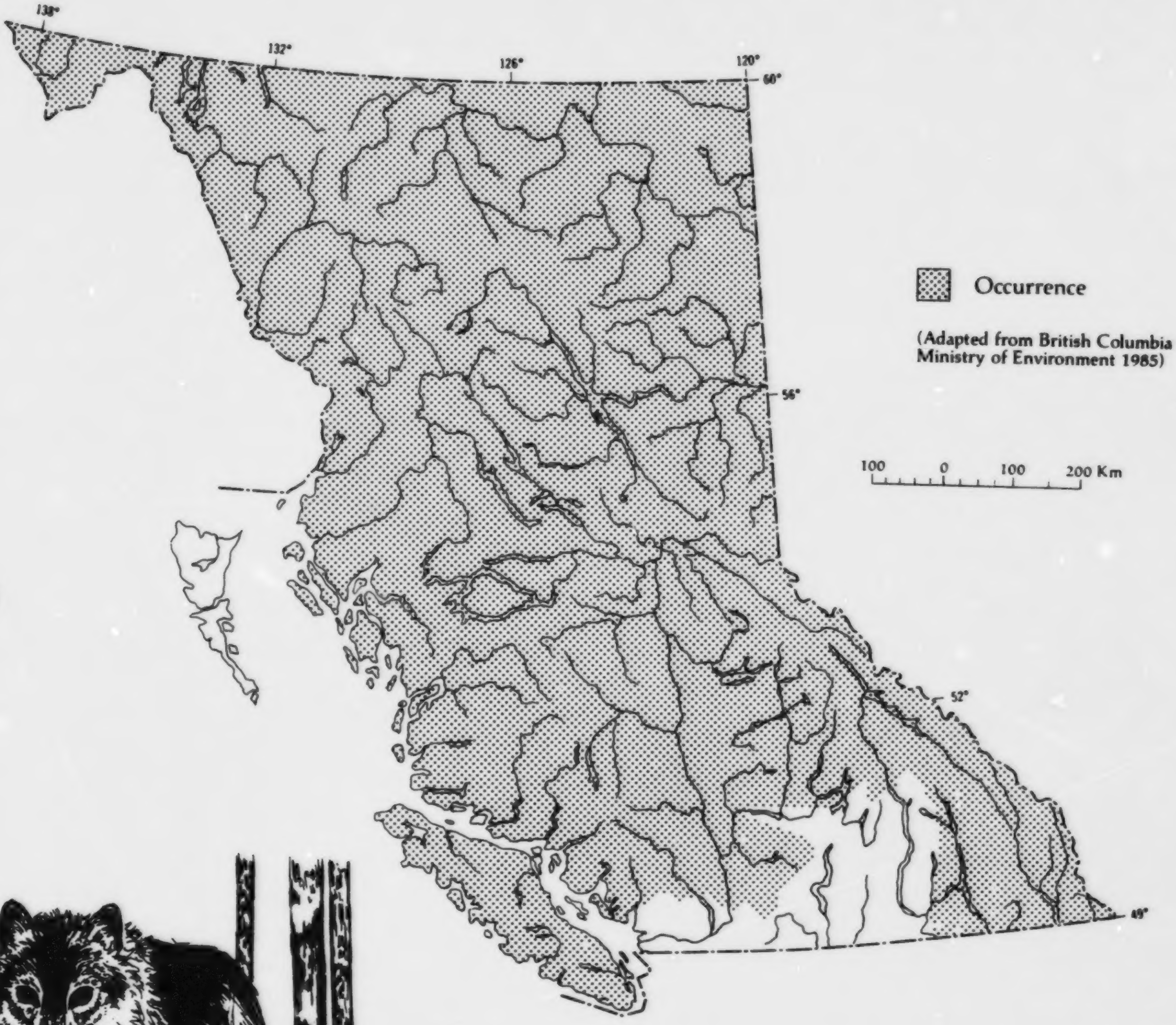
Other

Wolf kills provide food for a number of scavengers including ravens, Bald Eagles, foxes, small birds, and mammals. Some evidence that large wolf populations depress populations of Coyote, Wolverine, and Lynx (Mech 1974).

Selected References

Elliott 1983; Hatter 1984; Mech 1970, 1974; Petticrew and Munro 1979b; Scott 1979; Van Ballenberghe *et al.* 1975.

Gray Wolf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(Adapted from British Columbia Ministry of Environment 1985)

Coyote
CALA
Canis latrans Say

Distribution, Seasonality and Abundance

Distributed throughout most of mainland of the province except the coastal slopes; however, Coyotes do occur at sea level in the Fraser Valley. Provincial population is estimated to be 85 000 20% (Goodchild *et al.* 1980b). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Open forested habitats such as ponderosa pine parkland, aspen parkland, and subalpine parkland; also sagebrush steppe, southern and boreal bunchgrass steppe, and subalpine meadows. Common in agricultural areas.

SPECIFIC HABITAT ELEMENTS: Dens are usually made in a dry, open site such as a steep bank or a rock ledge with an unobstructed view. Thickets, hollow logs, or dens of other animals are also used. Water is usually found within 0.5 km (Cowan 1946). Breeding occurs between January and March and gestation is 63 days. The male brings food to the mother during the first few weeks after the pups are born. Pups stay with parents for at least 4-5 months and often until the following breeding season.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. May also forage in urban habitats. Also forage in disturbed areas where fires and logging have opened forested habitats.

SPECIFIC HABITAT ELEMENTS: Carnivores, but will eat some vegetable matter such as fruits. Winter diet is primarily carrion, both wild and domestic, and in the summer, rodents are the main food. Have also been known to prey upon rabbits, ducks, small ungulates, and livestock. Hunt for marmots in rockslides, and for small mammals in grasslands and meadows. Forested and agricultural habitats are often a source of carrion from larger game and domestic animals.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Utilize thickets or dense shrubs for resting and hiding cover.

Territory/Home Range

Social organization is variable as Coyotes may be solitary, in pairs, or in family units. Do not seem strongly territorial. Home range size varies directly with the size of the group, with winter ranges about twice the area of summer ranges (Merrill 1979). Studies done in the United States report home range sizes from 10 km^2 (Bekoff 1977) to 181 km^2 (Merrill 1979).

Activity and Movement Patterns

Active primarily in the evening but may also be active during the day. Average daily movement in northern Minnesota was 4 km (Bekoff 1977). Juvenile dispersal usually occurs in autumn and winter with pups often travelling 30-50 km or farther. In areas where habitat is saturated, dispersal may be delayed, resulting in larger packs (Messier and Barrette 1982). Regular seasonal migrations may occur in areas where prey migrates such as the deer in Kootenay National Park (Munro and Cowan 1944).

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

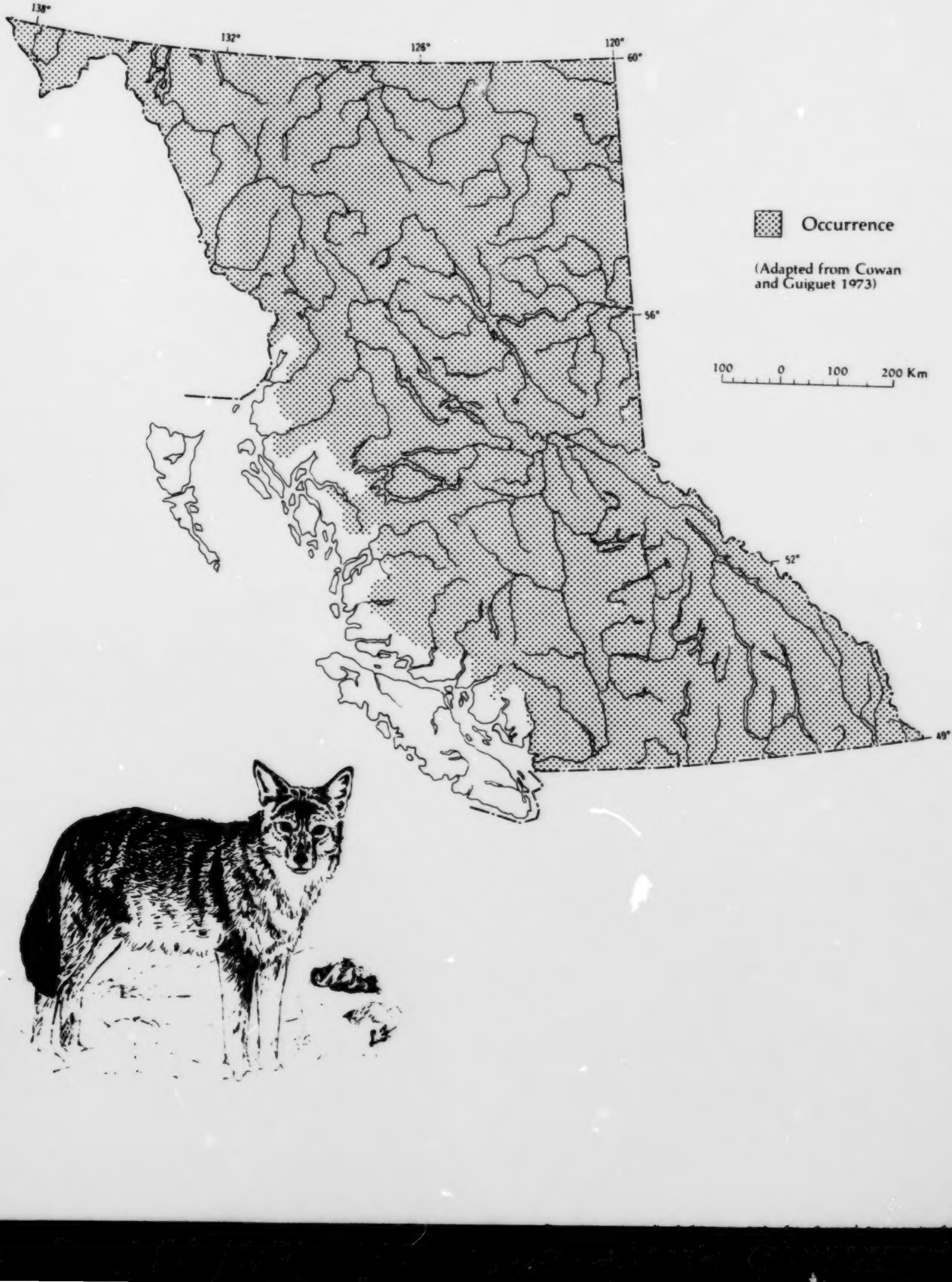
Other

Coyotes do not compete well with wolves, but are far better adapted to disturbed areas. Therefore, Coyotes have increased their range while wolf range has decreased.

Selected References

Bekoff 1974, 1977, 1978; Bowan 1982; Goodchild *et al.* 1980b.

Coyote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(Adapted from Cowan and Guiguet 1973)

Red Fox
VUVU
Vulpes vulpes (Linnaeus)

Distribution, Seasonality and Abundance

Distributed throughout the mainland except on the heavily forested western slopes of the coastal mountains adjacent to the ocean. Commonly use alpine/subalpine areas. Introduced to the east coast of Vancouver Island although none known to be present now. Provincial population estimated at 10 000 to 14 000 (Jackson *et al.* 1980).

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats interspersed with openings such as meadows, agricultural clearings, or burns.

SPECIFIC HABITAT ELEMENTS: Pups are born in dens in April/May. May dig their own dens or utilize caves, old Woodchuck and Badger burrows, or hollow logs. Require cover around den, usually a dense shrub layer, rocks, or logs. Dens have several entrances and Red Foxes often have several dens in close proximity for escape purposes.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements; usually hunt in habitats that support large populations of small mammals.

SPECIFIC HABITAT ELEMENTS: Omnivorous. Feed on small mammals, insects, fruits, birds (as large as grouse), and carrion. Afterbirths are important in spring, and upland game birds in winter. Have been known to follow timber wolves in order to use the remains of wolf kills. May store food in caches.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require resting areas and thermal cover, usually provided by thickets or dense shrub cover.

Territory/Home Range

Territorial behaviour is only evident during the late winter when denning activities begin. Home range size in the tundra averaged 1611 ha with a range of 277-3420 ha (Jones and Theberge 1982).

Activity and Movement Patterns

Most active at night but may be seen during late afternoon and early morning. Juveniles disperse in the fall.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

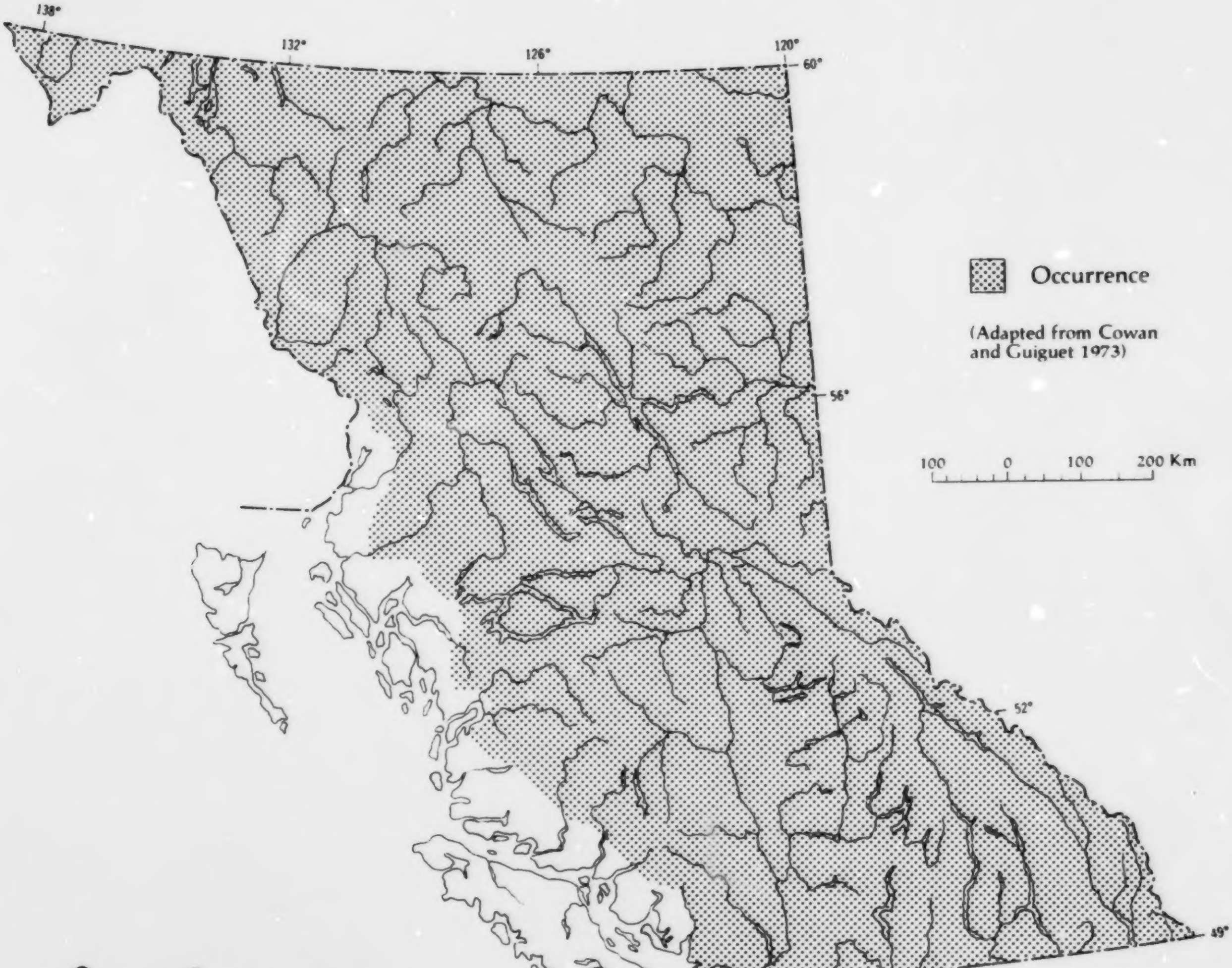
Other

Evidence from Ontario that Red Foxes avoid areas used by Coyotes (Voigt and Earle 1983). Populations cycle with a 9- to 10-year periodicity (Calhoun 1950), following the Snowshoe Hare population cycle.

Selected References

Ables 1975; Jackson *et al.* 1980; Jones and Theberge 1982; Samuel and Nelson 1982; Voigt and Earle 1983.

Red Fox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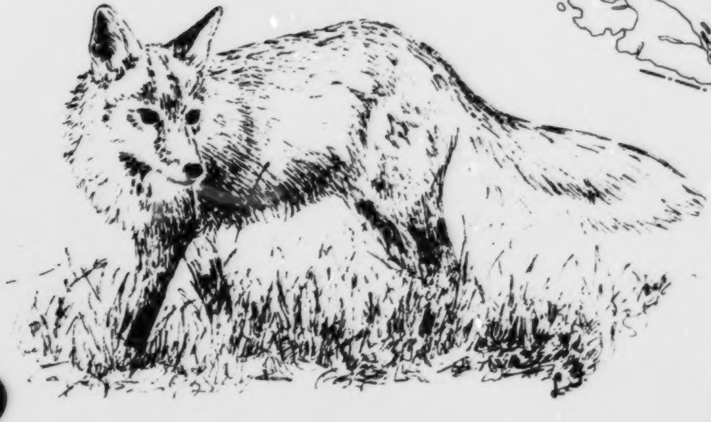


Black Bear
URAM
Ursus americanus Pallas
[American Black Bear]

Distribution, Seasonality and Abundance

Occur throughout the province from sea level to alpine areas. In 1980, the provincial population was estimated at 35 000 - 90 000 (Petticrew 1980). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Primarily forested habitats.

SPECIFIC HABITAT ELEMENTS: Breeding occurs in early summer. Cubs are born between mid-January and early February (delayed implantation). Birth and early maternal care occurs in winter dens. Denning sites have been reported in hollow trees, rock caves and crevices, fallen logs, or underground excavations. Cubs stay with their mother for about 1-1/2 years.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in forested habitats, lowland and alpine/subalpine wet meadows, avalanche shrubland, and aquatic habitats such as rivers and streams. In autumn, may forage in wild berry patches and aquatic habitats with spawning fish. May also feed in campgrounds, garbage dumps, and orchards. In spring, forage for succulent vegetation in wet meadows, riparian inclusions, skunk cabbage swamps, avalanche chutes, and burns.

SPECIFIC HABITAT ELEMENTS: Omnivorous and opportunistic. Green leafy material forms the bulk of their diet, especially in early summer. Also feed on insects, fruits, berries, fish, garbage, carrion, and small mammals. May prey on deer fawns, moose calves, or young livestock. Climb trees to feed on young shoots, buds, and fruit.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require denning sites for winter hibernation (see reproduction). Also utilize movement corridors such as dry creek beds, snowfilled avalanche chutes, logging roads, sandbars, or rivers. During periods of inactivity, periodically utilize bed sites in forest habitat with thick understory vegetation. These sites are often a simple shallow depression in forest leaf litter but may be a deep excavation. Climb trees for protection; this is especially important for cubs.

Habitat Requirements - Pattern

It is advantageous to Black Bears to have their spring foraging areas near their fall foraging areas or with appropriate connecting movement corridors. Generally they do not move more than 100 m from cover.

Territory/Home Range

Solitary for most of the year but pair up briefly during mating season. Exclusive home ranges are established by adult females during the summer. Adult male home ranges are generally larger than those of females and home ranges may change seasonally to account for weather and food availability. In a boreal forest in Alberta, average size of an adult male home range was 119 km^2 and 19.6 km^2 for females (Young and Ruff 1982).

Activity and Movement Patterns

Generally active at twilight, although breeding and feeding activities may alter this pattern seasonally. Movements are usually more extensive during late summer and fall when forage activities increase, and during the breeding season. A study in Minnesota determined that individuals have moved more than 160 km to take advantage of isolated pockets of food (Rogers 1977). Seasonal food concentrations may occur, particularly around garbage dumps. In northern areas, may hibernate up to 7 months, but in milder areas of the province, may be seen every month of the year. Do not go into deep torpor and can be aroused from dormancy if sufficiently disturbed.

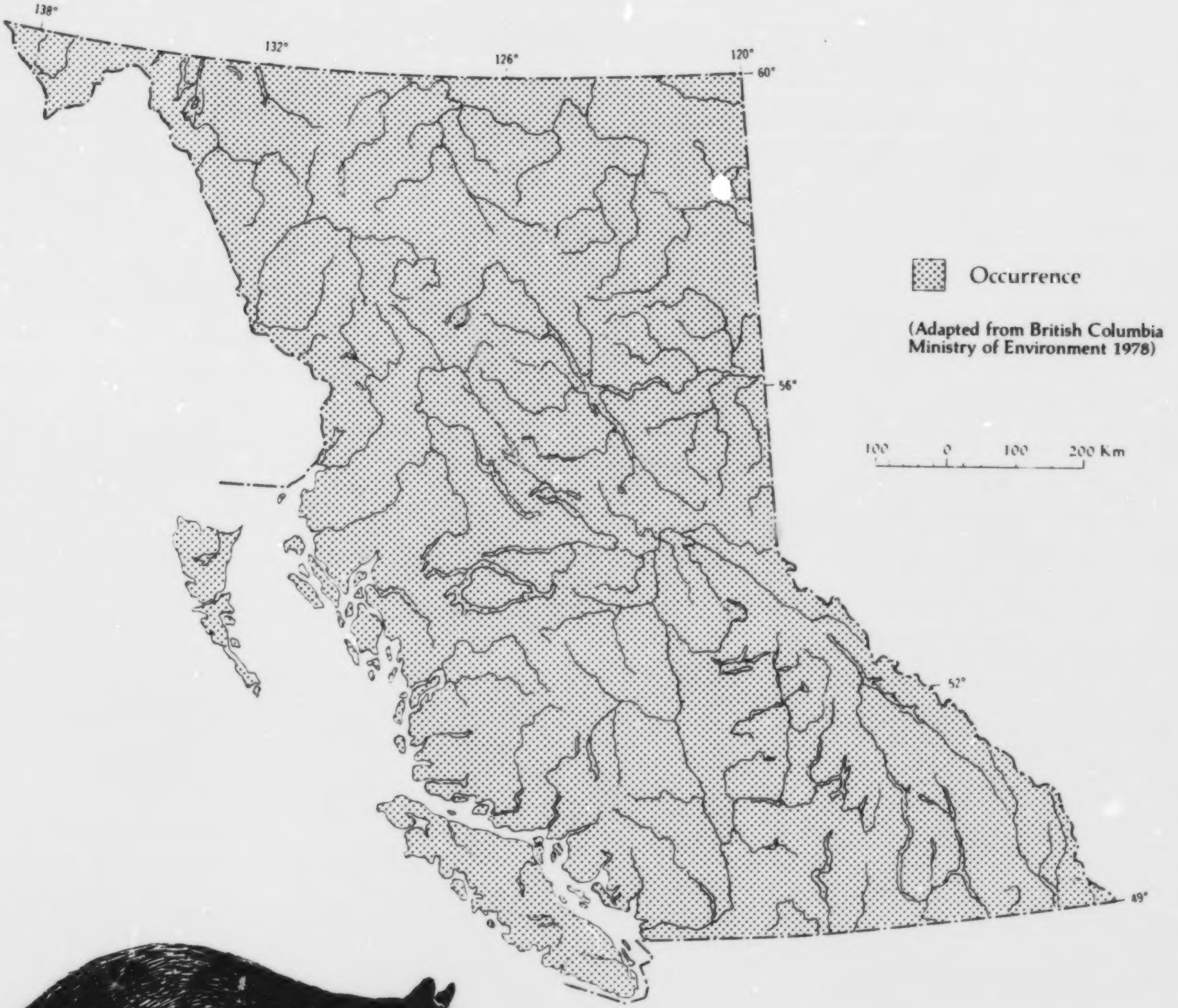
Status

Not in jeopardy. Protected as big game and a furbearer under the British Columbia Wildlife Act (1982).

Selected References

Jonkel and Cowan 1971; Pelton 1982; Petticrew 1980; Portscheller 1975.

Black Bear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(Adapted from British Columbia Ministry of Environment 1978)

Grizzly Bear
URAR
Ursus arctos Linneus
[Brown Bear]

Distribution, Seasonality and Abundance

Historically distributed throughout mainland of the province but now extirpated from parts of the south coast and southern interior. Most abundant in the coastal ecosystems and local areas in the southern Rocky Mountains (Flathead area and Glacier National Park). Provincial population estimated at 6000 -7000 (B.C. Ministry of Environment 1979). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Breeding occurs along coastal streams or in subalpine meadows. Natal/winter dens of coastal grizzlies generally occur in the forested subalpine, often at the coastal western hemlock/mountain hemlock boundary; interior grizzlies generally den above 2200 m in timber or open areas.

SPECIFIC HABITAT ELEMENTS: Breed from May to July and young are born in winter dens in late January, early February (delayed implantation). If dug, dens are usually excavated in areas with slopes greater than 30, deep soils, good drainage, and aspects where snow accumulates. Potential denning habitat should remain free from disturbances that cause stress and abandonment of dens.

Habitat Requirements - Feeding

HABITAT CLASSES: Occupy a wide range of habitat types from coastal coniferous forests through boreal forests to alpine/subalpine meadows and alpine tundra. Avalanche shrubland and shrub/seedling to young seral stages of forested subalpine are especially important to interior grizzlies. Sites associated with floodplain seral and estuarine habitats are important for coastal grizzlies.

SPECIFIC HABITAT ELEMENTS: Opportunistic omnivores but cannot digest fibrous vegetation. Feed on horsetails, grasses, succulent forbs, bulbs or tuberous roots of forbs such as glacier lilies, spring beauty, and hedysarum berries, particularly huckleberries, soopolallie, saskatoon, devil's club, elderberry, salmonberry, and kinnikinnick, insects, mammals (from small rodents to ungulates), fish, and carrion. Grizzlies, particularly in the interior, dig for rodents and tuberous roots and tear apart rotten logs and ant hills for insects. Riparian and swampy inclusions are an important source of grasses, sedges, and forbs. Following den emergence, winter-killed animals are often a major food source. Later in spring, deer fawns and Moose and elk calves can be major food sources. In the fall, old burns and young seral stages are utilized for berry crops in the interior. For coastal grizzlies, spawning salmon are the most important food source in the late summer and fall, although they do use the berry crop along valley bottoms. Hunter gut piles may also be used in the fall.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: During the summer, coastal bears may cool off in shallow day beds dug in the soft substrates of floodplain seral areas. Interior bears use snow patches, creeks, mud, or alder slides for cooling. Tree and/or shrub canopy, riparian inclusions, and rugged terrain provide hiding cover. May utilize forested streambeds or valley bottoms and timbered stringers between harvested units as travel corridors. Mature timber may provide shelter from heavy rain. Winter dens are excavated in the fall (these habitat requirements are outlined under reproduction).

Habitat Requirements - Pattern

Optimum grizzly habitat is composed of a structurally diverse combination of forested land and open habitats.

Territory/Home Range

Not territorial but maintain a social hierarchy. Home ranges vary greatly in area depending on sex, age, and food availability. Seasonal ranges, sometimes linked by a migratory corridor, may occur within total home range. Females with cubs generally have the smallest home ranges. In the British Columbia interior, males have an average home range size of 450 km^2 (range:250-3000 km^2). Coastal bears have smaller home ranges because of the topography of the coastal watersheds and the concentrated food resources. Home range size in the extreme north are much larger. Home ranges often overlap although adult females may maintain ranges exclusive of other adult females.

Activity and Movement Patterns

Most active during the evening and morning. During the fall they may be active for up to 20 h per day. Not true hibernators but enter period of winter dormancy. Length of dormancy influenced by food availability and climatic factors. Females with cubs den longer. In the interior, denning usually from 5 to 6 months beginning mid-October to mid-December and emerging mid-March to mid-May. Coastal bears den for 4-5 months generally November to March. May move extensively between seasonal food sources and denning sites. May concentrate seasonally at high energy food sources such as salmon spawning grounds and productive berry patches. In mountainous areas, generally move down to lower elevations and areas of low snow accumulation following emergence from winter den, then follow snow melt up into alpine/subalpine areas for the summer.

Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

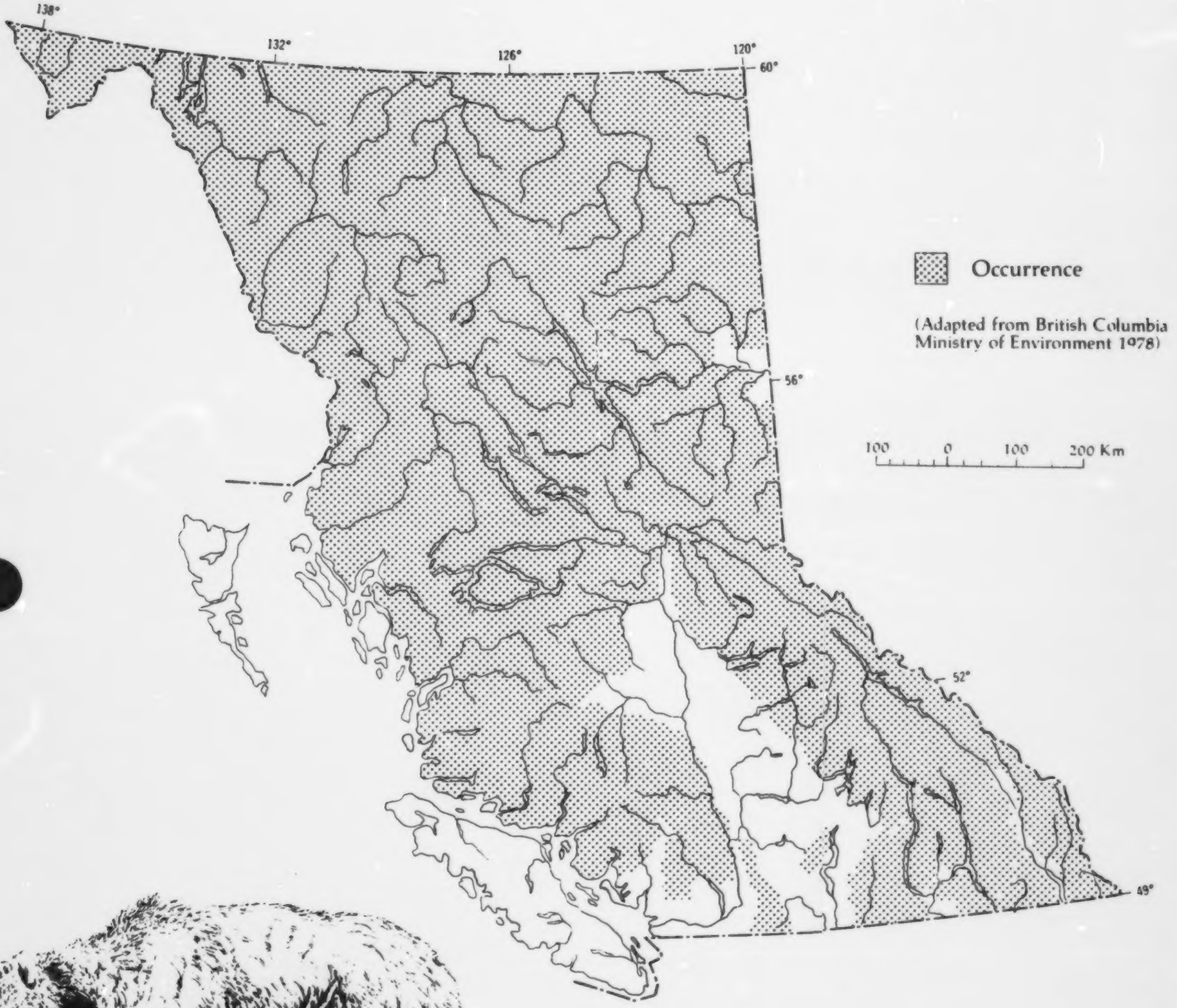
Other

Apt to become habituated to man-made sources of food (e.g. garbage dumps, livestock), drawing individuals from an extensive area. These bears have a lower chance of survival as they are marked "problem" bears. Can be overharvested readily as reproductive rate is low, especially in the interior. Locally extirpated in areas of high levels of human development.

Selected References

Archibald 1983; B.C. Ministry of Environment 1979; Craighead and Mitchell 1982; Hamer and Herrero 1983; Jonkel 1978; McLellan 1980; Zager and Jonkel 1983.

Grizzly Bear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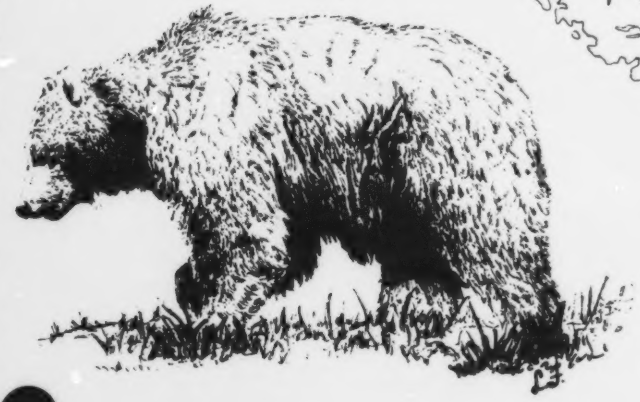


Raccoon
PRLO
Procyon lotor (Linnaeus)

Distribution, Seasonality and Abundance

Distributed throughout Vancouver Island, Saltspring, Saturna, and Pender islands, the Fraser Valley, the mainland coast north to Kingcome Inlet, and in the Okanagan Valley to Okanagan Falls. Introduced to Graham Island, the Queen Charlottes, and the east Kootenays. Provincial population estimated at 50 000 to 75 000 (Jackson *et al.* 1980). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Wide variety of habitats where water is available, including forested habitats, particularly deciduous riparian forests, wetlands, and agricultural and urban habitats.

SPECIFIC HABITAT ELEMENTS: Young are born between mid-April and mid-May. Tree cavities such as hollow limbs or trunks are preferred parturition sites. Dens are usually a minimum of 3 m above the ground. Close proximity to water is essential.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. Preferred foraging sites are riparian inclusions, stream banks, bogs, agricultural field edges, and orchards. In coastal areas, raccoons forage along shoreline.

SPECIFIC HABITAT ELEMENTS: Opportunistic omnivores. Most important animal foods are arthropods (e.g. crabs and crayfish) but also feed on birds, small mammals, fish, frogs, domestic fowl, injured waterfowl, and eggs. Important plant foods are berries, fruits, nuts, and seeds.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Utilize day resting sites, usually in trees; but in marshes and open fields, will rest in herbaceous cover. Tree cavities are the preferred winter denning sites. Ground burrows of other mammals may be used where hollow trees are scarce.

Territory/Home Range

Generally solitary. Males may be territorial with respect to other males, but not to females. Males have larger home ranges than females. In Ohio, home ranges averaged about 100 ha (Urban 1970).

Activity and Movement Patterns

Raccoons are primarily nocturnal. Do not hibernate, but there may be a period of winter dormancy. Juveniles disperse in the spring at age one.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

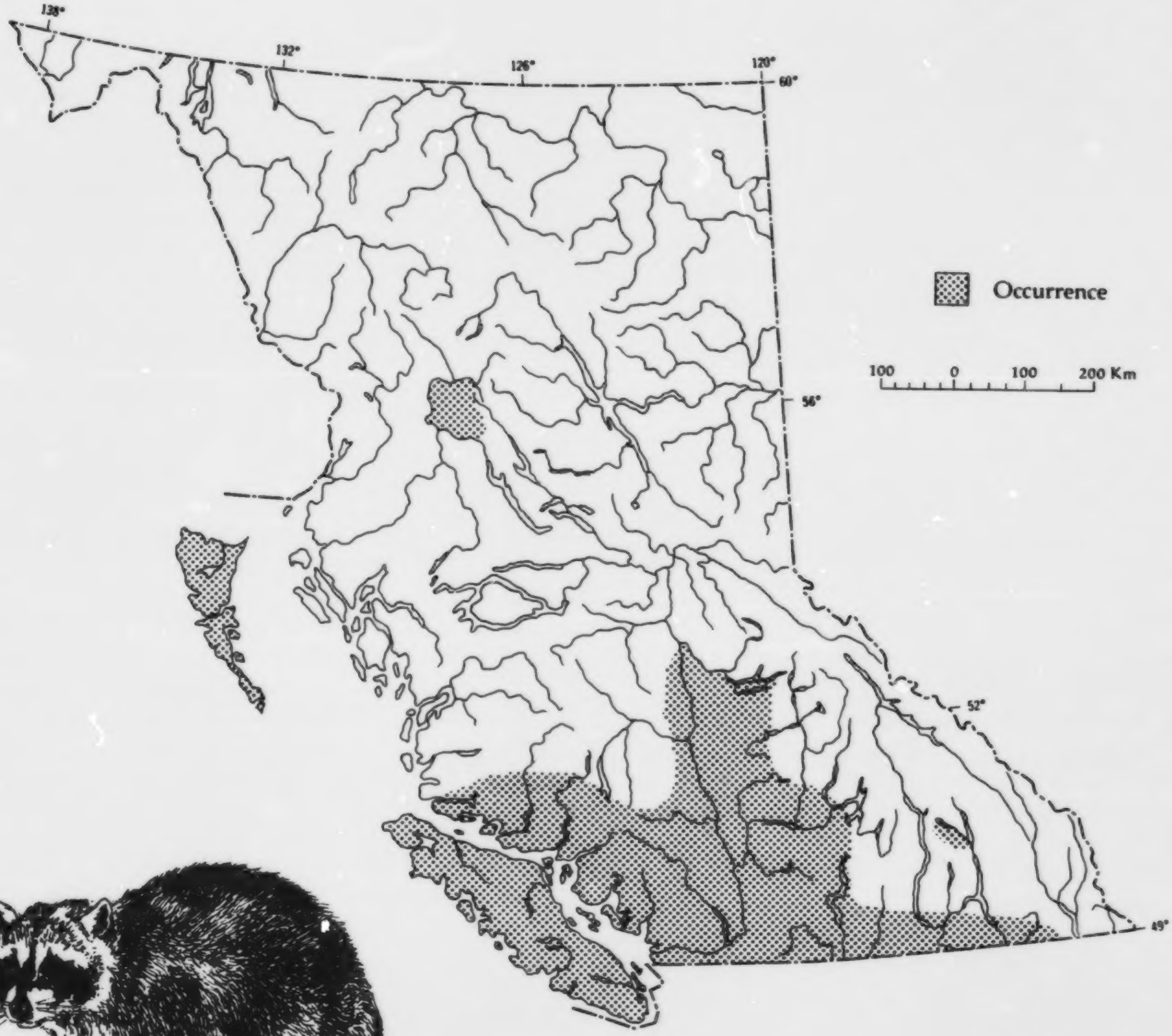
Other

Raccoons are reservoirs for several diseases of concern to man, among them leptospirosis, rabies, Chagas' disease, and tularemia.

Selected References

Banfield 1974; Berner and Gysel 1967; Kaufmann 1982; Lotze and Anderson 1979; Maser *et al.* 1981.

Raccoon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Marten
MAAM
Martes americana (Turton)
[American Marten]

Distribution, Seasonality and Abundance

Distributed throughout the province including Vancouver Island and the Queen Charlottes. Most abundant in central and northern British Columbia. Do not occur in alpine areas. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Prefers mature coniferous forests.

SPECIFIC HABITAT ELEMENTS: Breeding occurs in July/August followed by delayed implantation. Young are born from February through May, commonly in March and early April. Natal den sites include natural cavities in escarpments, under boulders, and in hollow logs and snags. Prefer areas with an herbaceous cover overhead.

Habitat Requirements - Feeding

HABITAT CLASSES: Similar to reproduction requirements, although Marten may also utilize younger mesic sites for hunting. Dry, open forests such as ponderosa pine parkland are seldom used.

SPECIFIC HABITAT ELEMENTS: Voles are the major prey species, especially in winter, but squirrels, hares and other small mammals, birds, fruits, carrion, and insects are also eaten. Hunt almost exclusively on the ground, but may also hunt in tree tops. In winter, most hunting is done beneath the surface of the snow. Windfall material is important as access to subnivean spaces. Prefer an overhead canopy but may utilize meadows and forest openings if food and nearby cover is available. Mesic sites with blowdowns, rotting stumps, and herbaceous cover are preferred hunting sites (coincides with preferred habitat of the Southern Red-backed Vole).

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Resting sites may be associated with recent kills. Preferred sites are ground-level, sheltered areas under logs, and in dense vegetation. In winter, sites below the snow in natural cavities between rocks, stumps, or downed trees are used almost exclusively. Use of trees as resting sites is less common and may be seasonal. Availability of denning sites, particularly in winter, may be more limiting than prey.

Territory/Home Range

Generally accepted that Marten, particularly adult males are territorial during the breeding season. Male home range size has been reported from 0.9 km^2 to 17.9 km^2 and female home range size from 0.5 km^2 to 8.5 km^2 (Stordeur 1985). Male-female home range overlap is the norm. Home range size is thought to be partly a function of availability of suitable cover types.

Activity and Movement Patterns

Active all year. In summer, peaks of activity occur at sunrise and sunset. In winter, activity peaks in the late morning and late evening to sunset. Activity patterns affected by inclement weather, extreme temperatures, and previous hunting success. Reported average daily movements varied from 0.97 km to 5.9 km for males and 0.2 km to 4.7 km for females (Stordeur 1985). Juvenile dispersal usually occurs from August through November.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

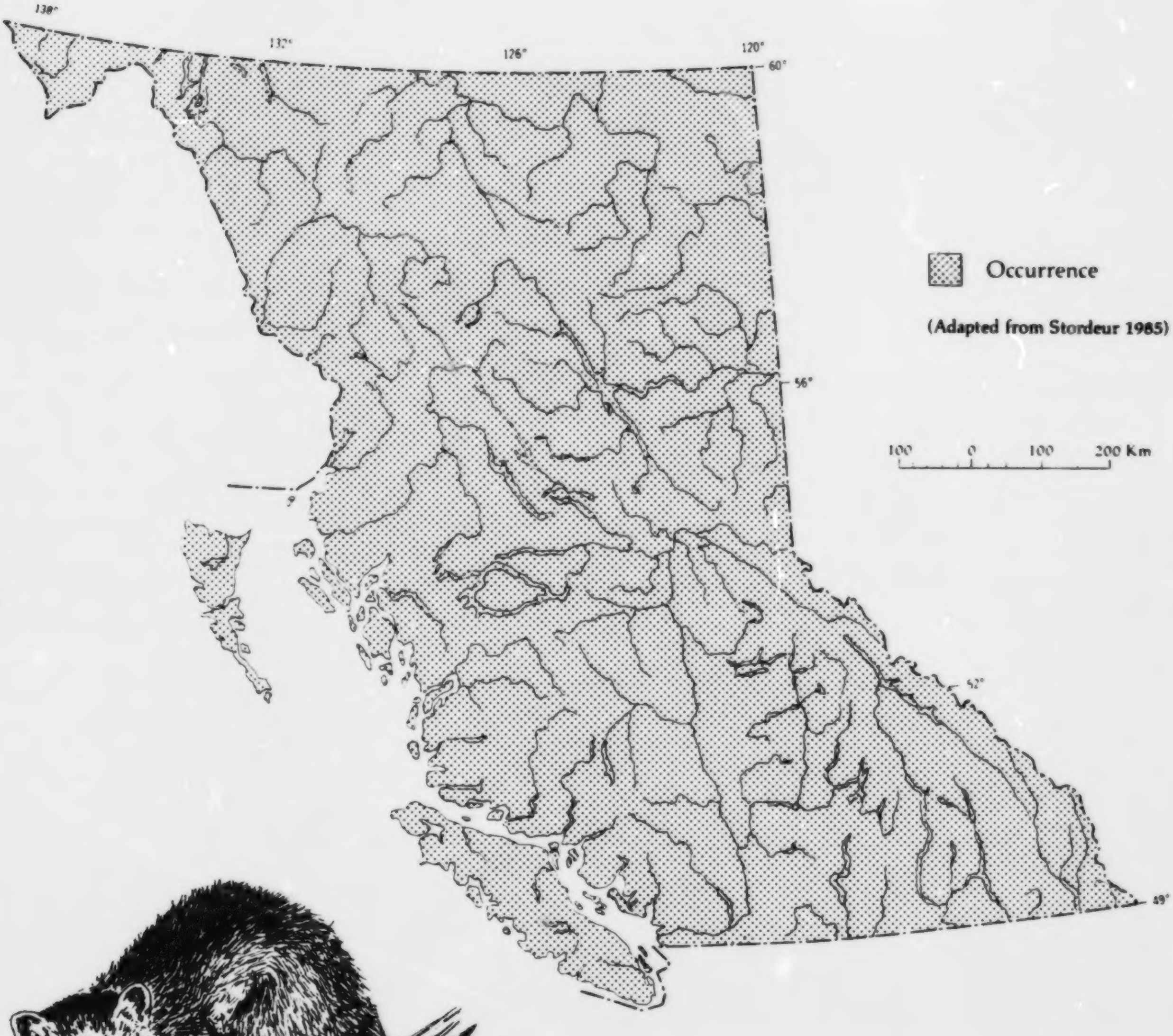
Other

Marten are adversely affected by some types of logging, particularly clear cutting (Soutiere 1979). Timber harvesting and burning can greatly reduce preferred small mammal populations and canopy cover and thus cause increased snow depth affecting hunting efficiency.

Selected References

Hawley and Newby 1957; Kelly 1982; Koehler *et al.* 1975; Quick 1955; Stordeur 1985.

Marten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(Adapted from Stordeur 1985)

Fisher
MAPE
Martes pennanti (Erxleben)

Distribution, Seasonality and Abundance

Distributed throughout most forested areas of the mainland; rare in the extreme northeast portion of British Columbia, absent or rare along coast, and absent from the southern interior. The estimated provincial population is 10 000 to 15 000 (Munro and Jackson 1979). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Conifer-dominated and mixed forest habitats.

SPECIFIC HABITAT ELEMENTS: Breed in April and give birth the following March (delayed implantation). Nesting dens are usually located high in snags or hollow trees although dens in rocky ledges may be utilized.

Habitat Requirements - Feeding

HABITAT CLASSES: Conifer-dominated and mixed forest habitats. Prefer climax forests with high, dense canopy closure and avoid areas with no overhead cover, such as fields, roads, burns, and open wetlands.

SPECIFIC HABITAT ELEMENTS: Generalized predators. Diet varies from area to area but most common prey are Snowshoe Hares and Porcupines, however will also eat small rodents (such as squirrel and voles), birds, eggs, carrion, insects, fruits, and nuts. Search for and pursue prey on the ground, in burrows, and in trees. Fishers are adaptable and prefer habitats with high small mammal diversity.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Temporary dens for resting and cover are found in hollow trees, logs, stumps, brush piles, rockfalls, old burrows, under snow, or in abandoned Beaver lodges. Sleeping sites may be used repeatedly.

Territory/Home Range

Individuals are solitary and probably do not have overlapping home ranges. Home ranges are large, particularly for males. In New Hampshire, home range sizes varied from 6.6 km^2 to 39.6 km^2 (Powell 1982). Fishers often travel along regular hunting circuits from 10-30 km in diameter (Strickland *et al.* 1982).

Activity and Movement Patterns

Generally nocturnal or crepuscular although daytime activity is not uncommon. May alternate active periods with resting over an entire 24-hour period. Active all year although they will retreat to a den during severe weather. Average daily movements are about 5 km with adult males travelling the farthest. Fishers travel greater distances in the winter than the summer.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

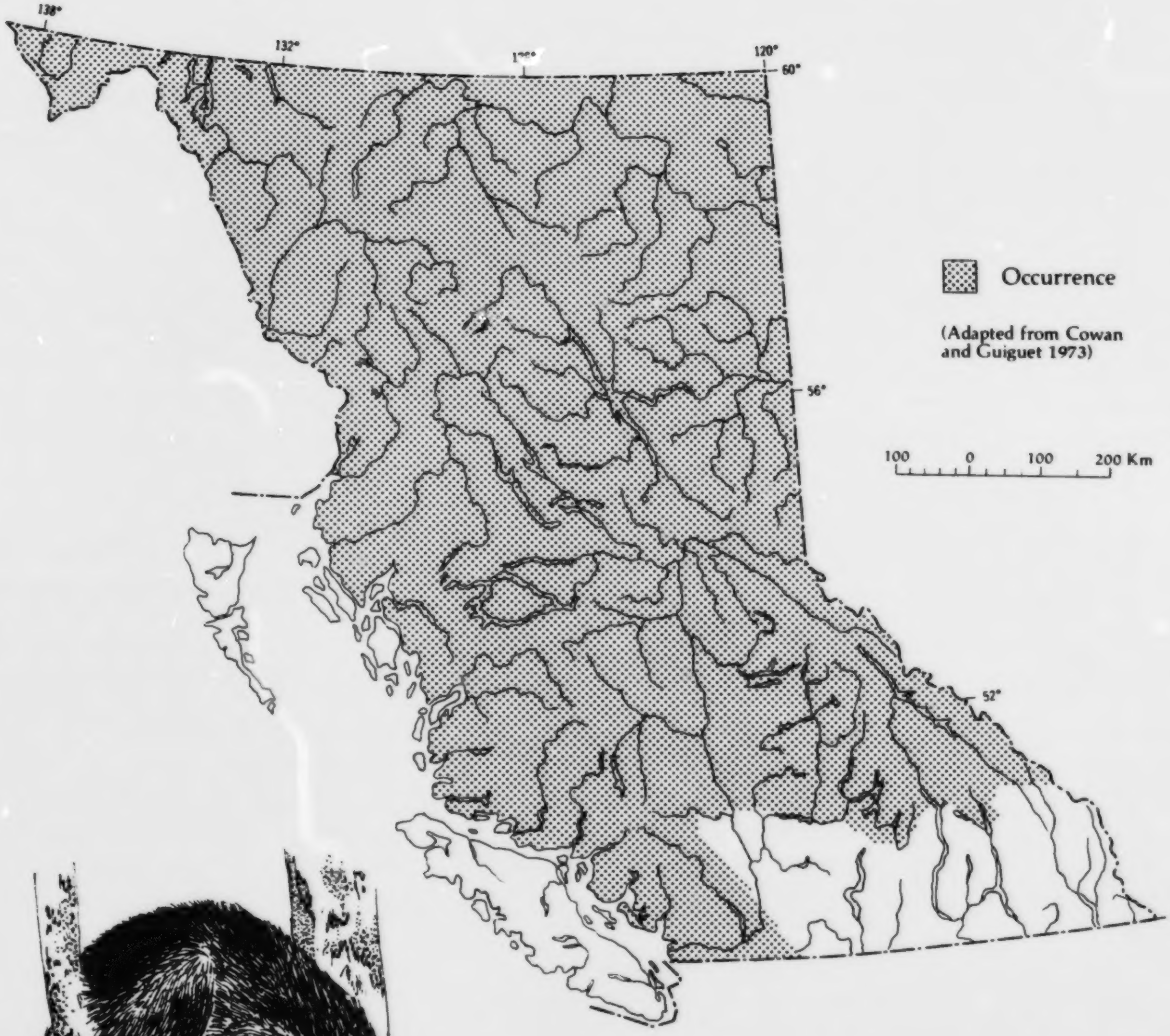
Other

Porcupines are the only prey species whose population levels are affected by Fishers. Fishers use similar habitat to Marten but coexistence is possible because of size difference and therefore differences in prey. Fishers sometimes prey on Marten (Raine 1983).

Selected References

Coulter 1966; Munro and Jackson 1979; Powell 1981, 1982; Strickland *et al.* 1982.

Fisher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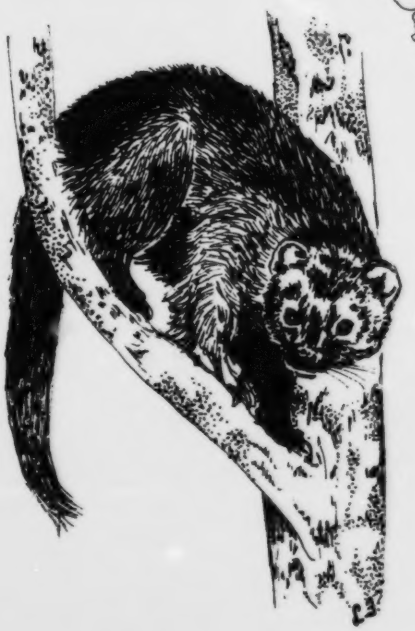


Ermine
MUER
Mustela erminea
[Short-tailed Weasel, Stoat]

Distribution, Seasonality and Abundance

Distributed from sea level to 3000 m throughout British Columbia, including the Queen Charlottes and Vancouver Island. Native yearlong resident. Total weasel population in British Columbia is estimated to be 350 000 to 750 000 (Munro and Jackson 1979). This estimate includes Ermine, Long-tailed Weasel, and Least Weasel.

Habitat Requirements - Reproduction

HABITAT CLASSES: Variety of early successional communities including open forested habitats, herbaceous-dominated and shrub-dominated habitats.

SPECIFIC HABITAT ELEMENTS: Breed in May/June, with parturition occurring the following April (delayed implantation). Nest in the burrows of mice, ground squirrels, chipmunks, and gophers or in hollow logs, under roots, and buildings.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. Often associated with water. Hunt in rockslides, coniferous forest edge, deciduous forests, lowland wet meadows, riparian inclusions, banks of streams and lakes, sea beaches, and cultivated fields.

SPECIFIC HABITAT ELEMENTS: Small mammals, especially small rodents are the main prey items. Also feed on small birds, fish, amphibians, insects, and some vegetation. Cache surplus prey. Primarily terrestrial although they may pursue squirrels and chipmunks in trees. Small enough to enter the burrow systems of some of the larger small mammals such as voles and harvest mice. During the winter, burrow under the snow and prey on small mammals.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Usually stay close to cover such as logs, talus, herbaceous or shrub layer. Utilize dens for resting and cover.

Territory/Home Range

Solitary. Residents maintain territories and transients do not. Territories of males may include one or more female territories, but exclude other males. A study in Ontario found the average male home range to be 21.3 ha while that of females was 11.7 ha (Simms 1979). Other studies report male home ranges between 8-34 ha and female home ranges between 2-10 ha (Svendson 1982).

Activity and Movement Patterns

Active for short periods (10-45 minutes) alternating with periods of rest, about every 3 to 5 hours throughout the 24-hour day. Active all year. Males travel significantly greater distances per unit time than females, particularly during the breeding season when they may cover as much as 70% of their home range in 9 days (Simms 1979).

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

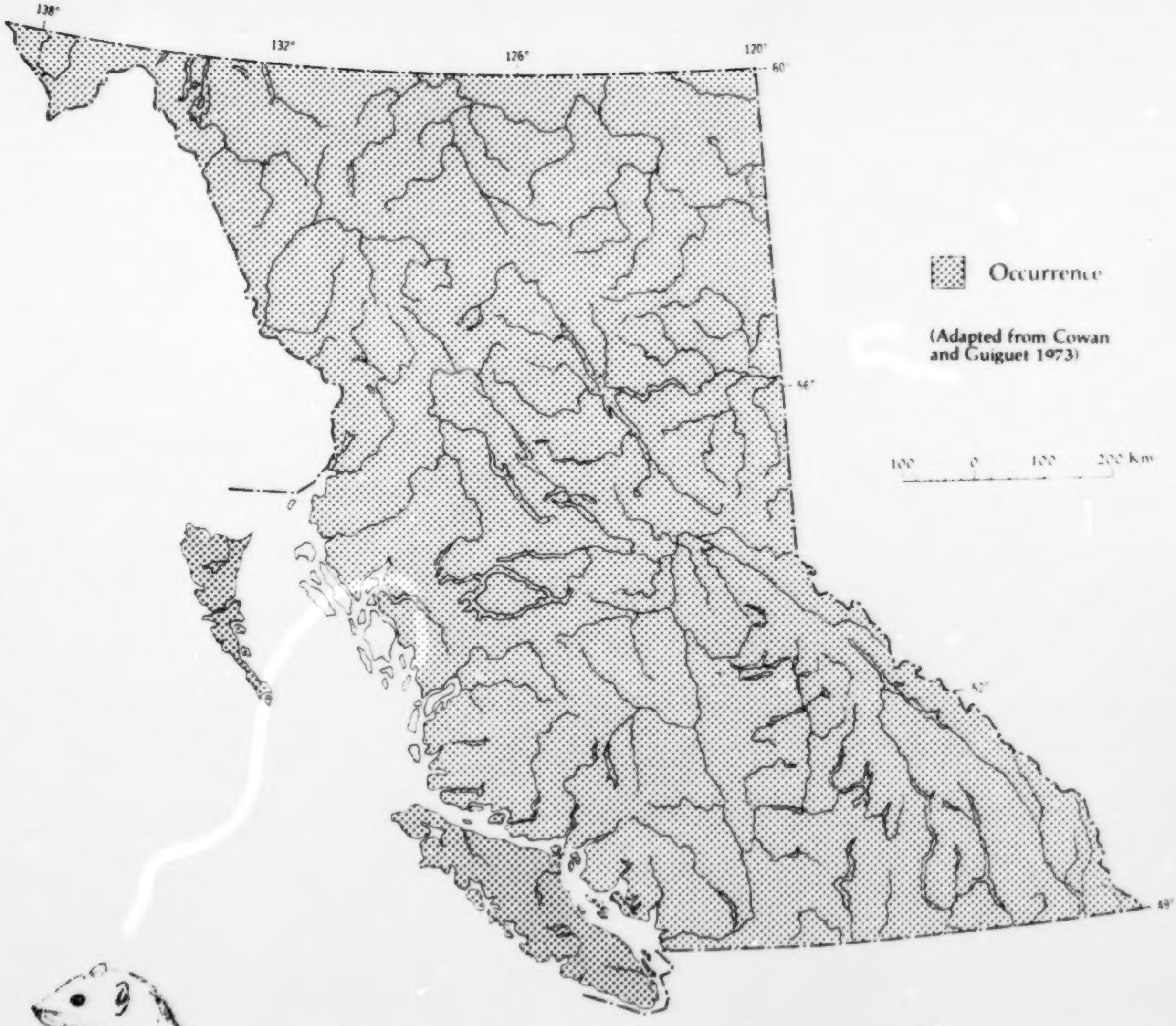
Other

Population fluctuations are closely tied to small mammal population levels. Ermine successfully controlled populations of rodents on an island, but not in a forest in Canada (Sullivan and Sullivan 1980).

Selected References

King 1983; Munro and Jackson 1979; Svendson 1982.

Ermine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(Adapted from Cowan and Guiguet 1973)

Long-tailed Weasel
MUFR
Mustela frenata Lichenstein

Distribution, Seasonality and Abundance

Distributed south of 54N, but not including the Coast Range, however does occur in the extreme southwest corner of the province to the coast. Native yearlong resident. The current population of weasels is estimated to be 350 000 to 750 000 (Munro and Jackson 1979). This estimate includes Ermine and Least Weasel.

Habitat Requirements - Reproduction

HABITAT CLASSES: Wide variety of habitats including conifer-dominated habitats, trembling aspen forests, and southern bunchgrass steppe.

SPECIFIC HABITAT ELEMENTS: Mating occurs in July and August and young are born between early March and early April (delayed implantation). Nest in burrows usually dug by other species. May also nest in rotten tree trunks and other arboreal sites.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. May also hunt in alpine tundra, wetland and agricultural habitats. Less habitat specific than smaller weasels. Usually found in later seral stages of forested habitat and often associated with water.

SPECIFIC HABITAT ELEMENTS: Carnivorous generalists. Prey on the young of rabbits, voles, Deer Mice, Meadow Jumping Mice, shrews, ground squirrels, Pikas, squirrels, and birds. Often hunt in forest edges, brushy borders of cultivated fields, swamps, rockslides, grasslands, and margins of rivers, streams, and lakes. Cannot pursue prey species into burrows because of large size, resulting in partitioning of food resources between weasel species.

Habitat Requirements - Special Needs

HABITAT CLASSES: Utilize cover for resting and hunting, usually in the form of dense vegetation.

Territory/Home Range

Solitary. In sub-optimal habitat, do not defend home ranges. May range over areas from 10-50 ha; average home range size is 10-20 ha (Burt and Grossenheider 1976).

Activity and Movement Patterns

May be active day and night. Juvenile females disperse while males remain on their natal home range.

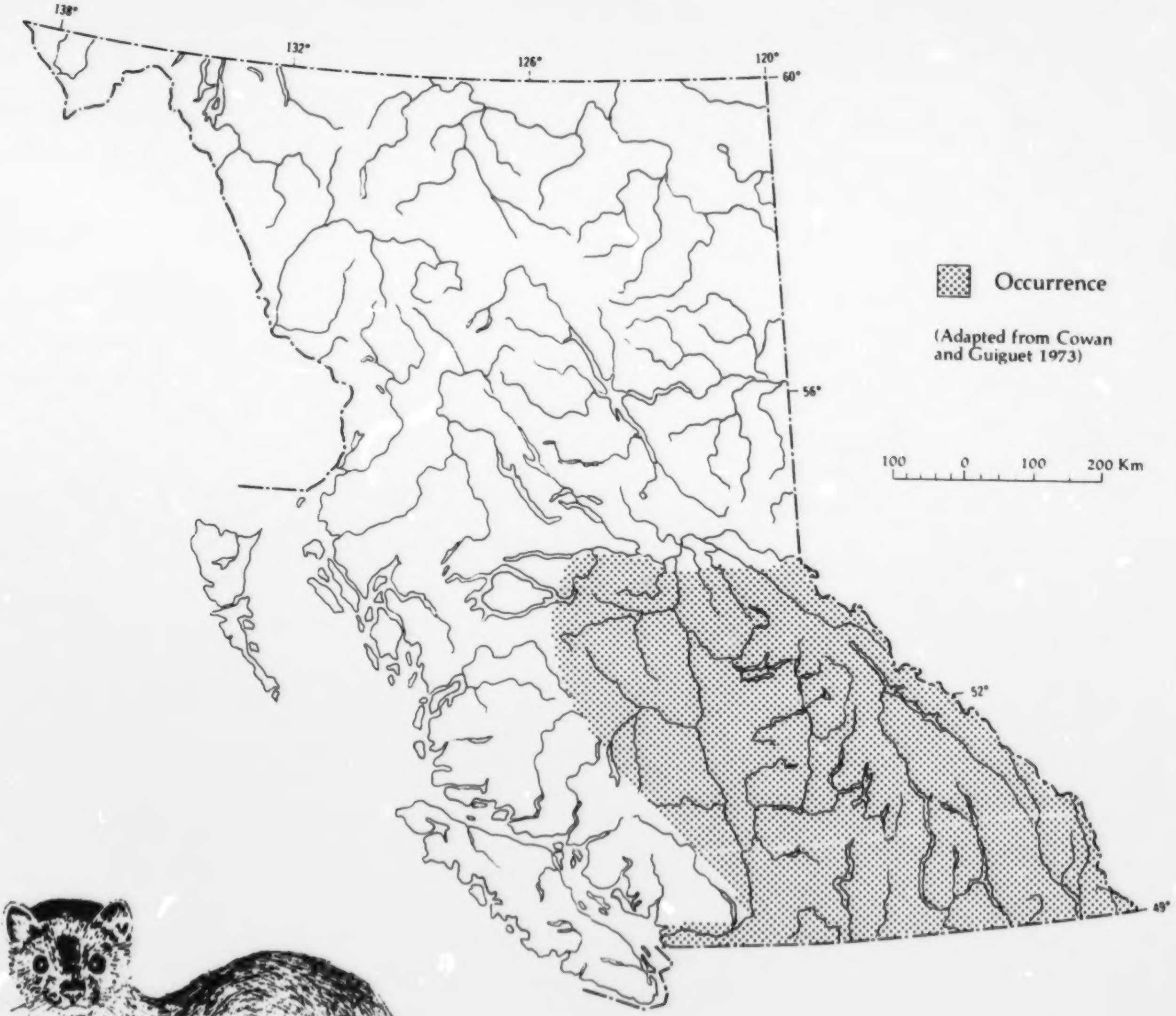
Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

Selected References

Gamble 1981; Munro and Jackson 1979.

Long-tailed Weasel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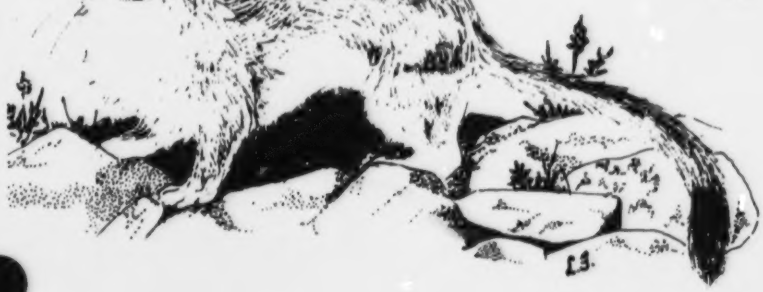


Mink
MUVI
Mustela vison Schreber
[American Mink]

Distribution, Seasonality and Abundance

Distributed throughout the mainland and coastal islands; common wherever permanent water is available. Native yearlong resident. Successfully introduced to Lanz Island and has spread to Cox Island. Mink populations are estimated to be 50 000 to 100 000 in British Columbia (Munro and Jackson 1979).

Habitat Requirements - Reproduction

HABITAT CLASSES: Found in coastal habitats, wetland habitats, and the banks of slow permanent riverine, lacustrine, and pond habitats.

SPECIFIC HABITAT ELEMENTS: Parturition occurs in late April/early May in nests in available shelter along river banks, or stumps and hollow logs in adjacent forest. May utilize abandoned burrows, old beaver lodges, or muskrat lodges as denning sites.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. Coastal populations use the intertidal zone to forage and island populations may destroy seabird colonies. Inland populations forage in wetlands and along the banks of rivers, streams, lakes, and ponds or right in the water as mink are excellent swimmers.

SPECIFIC HABITAT ELEMENTS: In coastal areas, feed on fish, crabs, small crustaceans, juvenile seabirds, and eggs. Inland populations feed on mice, hares, birds, Muskrats, fish, amphibians, and crustaceans.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Females normally occupy one or two dens to raise their young but males may utilize two to five dens for resting and cover. May use trees for escape cover.

Territory/Home Range

Mink are solitary, unsociable animals. On Vancouver Island, home ranges were measured linearly. Males averaged 0.72 km of shoreline while females averaged 0.41 km of shoreline (Hatler 1976). Range size was inversely proportional to the quality of local hunting. Female territories were found within male territories and territories were maintained by marking.

Activity and Movement Patterns

In coastal areas, the tide level was more important to activity level than the time of day. At low tide, Mink are more active than at high tide. Inland populations are generally nocturnal. Mink are active all year. Juveniles are the most mobile segment of the population; dispersal occurs in the fall. Males move greater distances than females and overall movement increases during the mating season.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

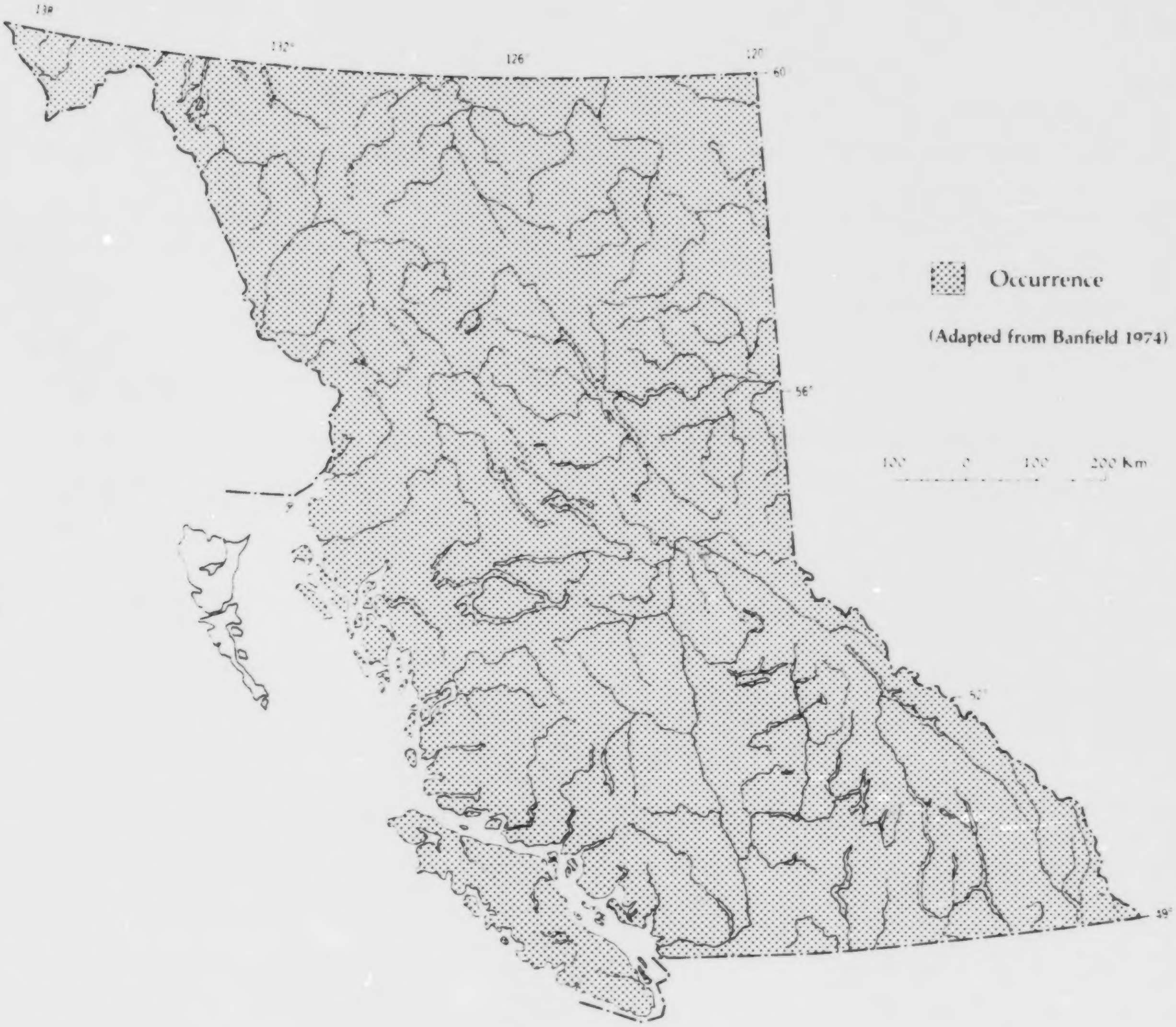
Other

Populations do not cycle. In some areas, population levels of Mink are related to the population levels of Muskrats.

Selected References

Hatler 1976; Maser *et al.* 1981; Melquist *et al.* 1981; Mitchell 1961; Munro and Jackson 1979.

Mink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(Adapted from Banfield 1974)

Wolverine
GUGU
Gulo gulo (Linnaeus)

Distribution, Seasonality and Abundance

Not common but distributed throughout the mainland and Vancouver Island in forested habitats at a wide variety of elevations but limited to mountainous areas in the southern part of the province. Population estimated at 5000 to 8000 (Munro and Jackson 1979). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Conifer-dominated habitats.

SPECIFIC HABITAT ELEMENTS: Young are born between late February and mid-April in dens, usually in natural caves, rock-slides, or excavated burrows under the roots of trees or windfalls.

Habitat Requirements - Feeding

HABITAT CLASSES: Conifer-dominated habitats, alpine tundra, and fresh emergent wetland habitats. Presence of adequate prey populations more important than topography or plant associations. During the winter, Wolverine usually descend into valleys where game is more plentiful, although they may be found at high elevations. The cover of mature or intermediate timber appears to be important in Wolverine habitat selection, although they are found in other areas when prey is abundant.

SPECIFIC HABITAT ELEMENTS: Omnivorous in the summer, feeding on carrion, small mammals, birds and their eggs, insects and their larvae. Become primarily carnivorous in the winter, preying and scavenging on large mammals such as caribou. Wolverine are effective predators of larger mammals only in deep snow. May bury food caches under ice and snow.

Territory/Home Range

Solitary and territorial. Have large home ranges, up to 963 km^2 (Koehler *et al.* 1980). Several female ranges generally overlap with the home range of a male. Lactating females and juveniles have smaller home range sizes than males.

Activity and Movement Patterns

Active all year, particularly in winter. Their daily rhythm is divided into 3- to 4- hour periods alternating between resting and walking/foraging. Wolverines of both sexes are forced to disperse as yearlings, unless there is a territory vacancy in their home range. Males generally move twice as far as females in a given time.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

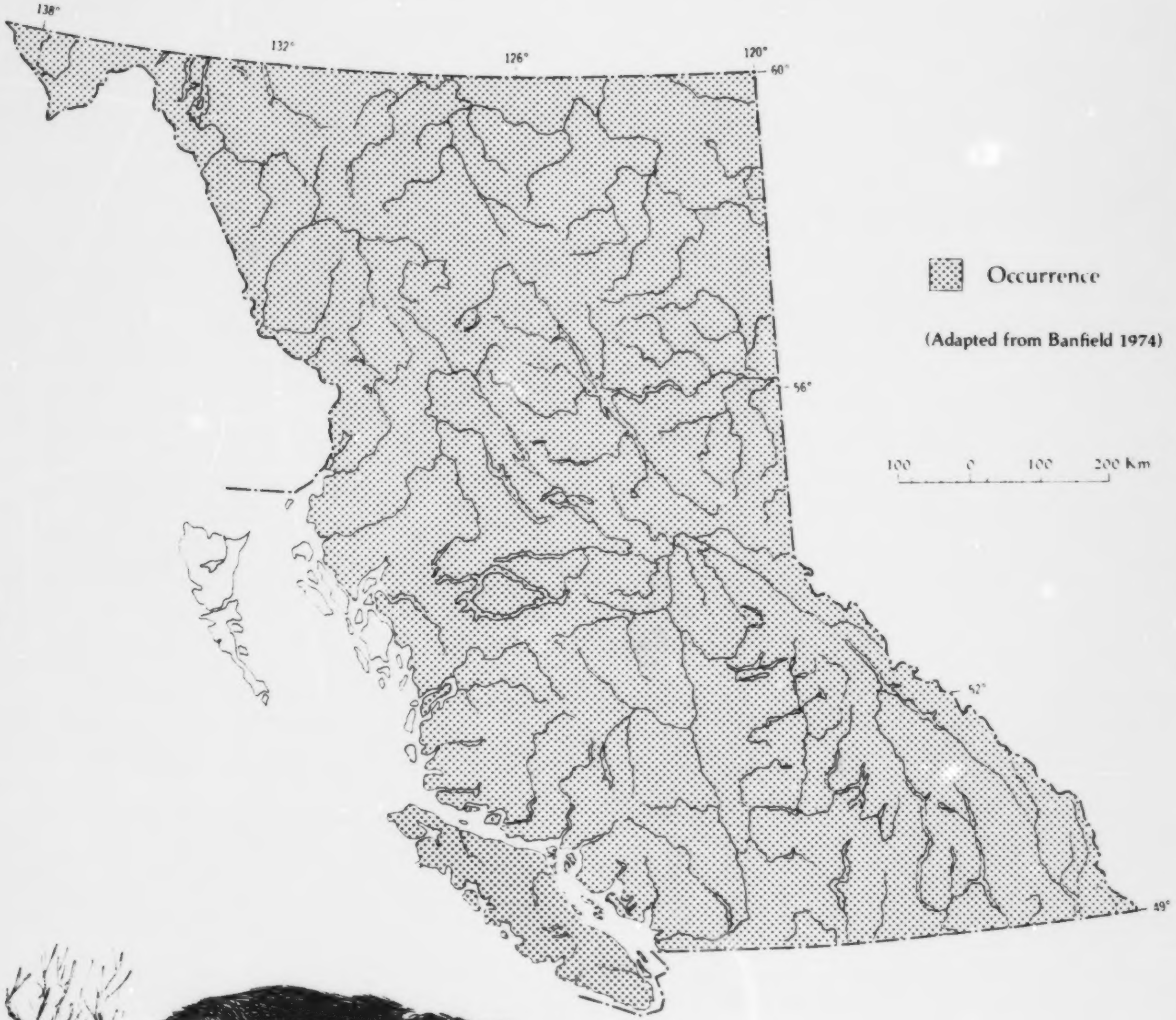
Other

Some individuals may cause considerable damage to commercial traplines. Wolverine are considered valuable as a furbearer because their fur is frostfree.

Selected References

Banci 1982; Banfield 1974; Hornocker and Hash 1976; Munro and Jackson 1979.

Wolverine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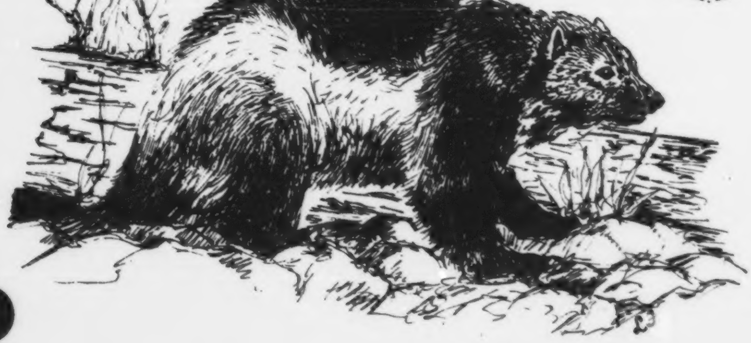


Badger
TATA
Taxidea taxis (Schreber)
[Yellow Badger, American Badger]

Distribution, Seasonality and Abundance

Distributed in interior British Columbia north to Quesnel, west of the Fraser River, and then southwest to the Rockies, in a wide range of altitudes in treeless areas. Provincial population is estimated between 100 and 1000 (Munro and Jackson 1979) and is decreasing (Long and Killingley 1983). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Found in open habitats such as sagebrush and southern bunchgrass steppe, ponderosa pine parkland, and agricultural habitats.

SPECIFIC HABITAT ELEMENTS: Breeding occurs in the summer, with birth occurring the following spring in natal dens. Natal dens are structurally more complex than resting dens, usually having separate chambers and several tunnels. Require deep friable soil for burrow excavation.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements.

SPECIFIC HABITAT ELEMENTS: Opportunistic carnivores. Generally feed on burrowing rodents such as ground squirrels but will also feed on rabbits, birds, reptiles, fish, insects, and carrion. Adapted for digging and often enter the burrows of their prey and corner the occupant or ambush them when they return.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use large burrows all year as diurnal resting sites and for food storage. Variable in characteristics because most are dug in the pursuit of prey. Usually a new den is used each day during the summer with more constant use of a single den as winter approaches.

Territory/Home Range

Solitary except during the breeding season. Home range size throughout the year has been estimated at 850 ha for a female badger with seasonal size within that area ranging from 2 ha in winter to 725 ha in summer (Sargent and Warner 1972). Another study in Utah estimated male home range size to be 583 ha while females occupied about half that area (Lindzey 1978).

Activity and Movement Patterns

Primarily nocturnal, resting in dens during the day and hunting at night. Far more active during the summer than during the winter, often staying underground for long periods between November and April. Not true hibernators, but may enter a state of torpor (Harlow 1981). Dispersal of juveniles occurs in early August. Movements increase in June because of breeding activities.

Status

Threatened. Protected as a furbearer under the British Columbia Wildlife Act (1982). Currently receiving special attention from Wildlife Branch.

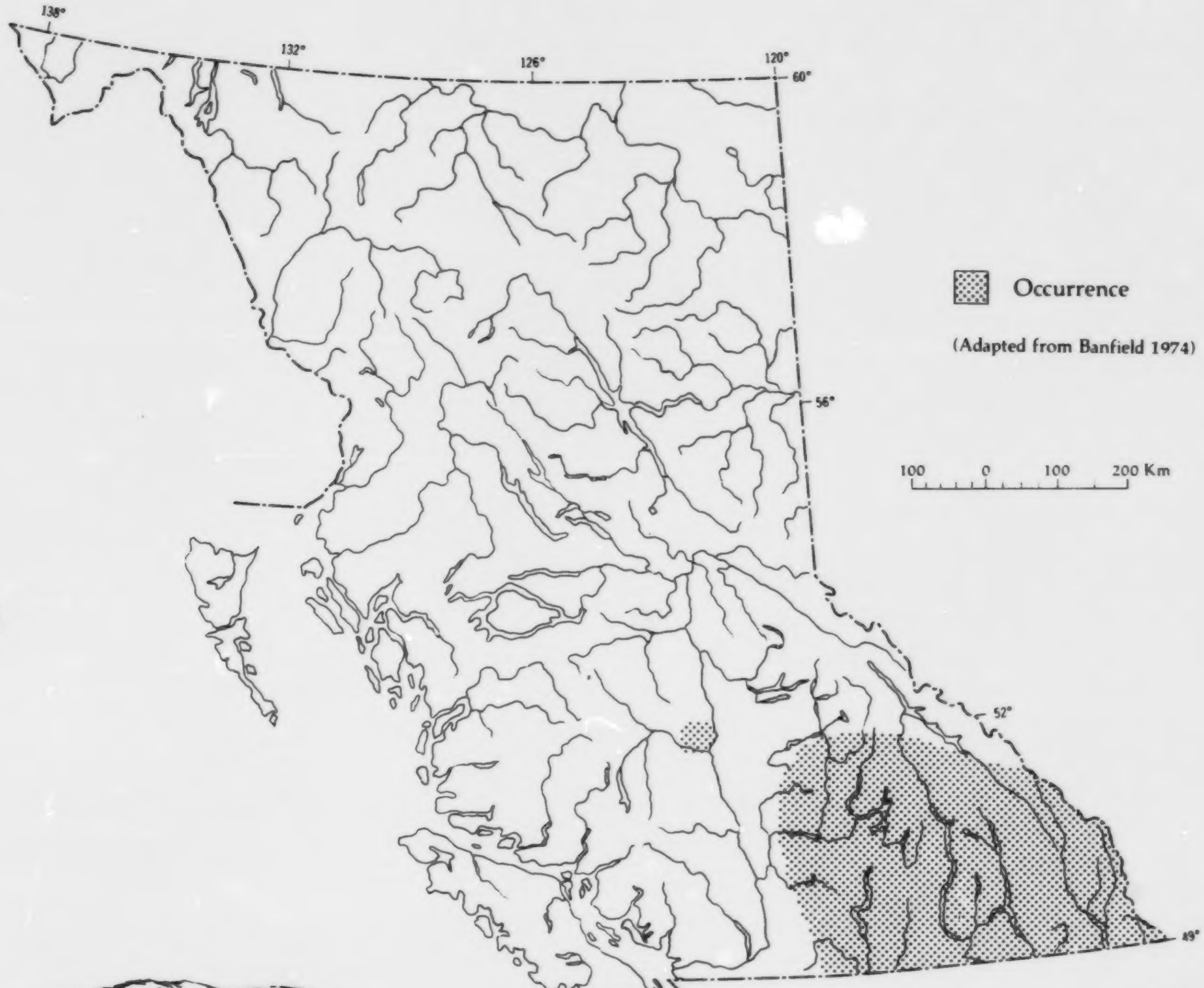
Other

Valuable for rodent control although extensive digging may also cause damage in agricultural areas.

Selected References

Lindzey 1976; Long 1973; Long and Killingley 1983; Munro and Jackson 1979; Sargeant and Warner 1972; Snead and Hendrickson 1942.

Badger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(Adapted from Banfield 1974)

Striped Skunk
MEME
Mephitis mephitis (Schreber)

Distribution, Seasonality and Abundance

Distributed east of the Coast Range and north to the Liard River. Also occur in the Puget Sound lowlands. Rare in coastal forests. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Occur in a variety of open forested habitats and agricultural habitats.

SPECIFIC HABITAT ELEMENTS: Utilize underground dens for parturition and nursing. May use rock piles, abandoned burrows of other large burrowing mammals such as Woodchucks or Badgers or may excavate their own dens, usually on a slope for good drainage. Birth occurs in May to early June and the young are weaned late June to early August.

Habitat Requirements - Feeding

HABITAT CLASSES: Same as reproduction requirements. Also may forage in fresh emergent wetlands. Forage in open areas such as hayfields and marshes, interspersed with areas of dense cover such as hedgerows and thickets. Also forage along the margins of aquatic habitats such as rivers, streams, and ponds.

SPECIFIC HABITAT ELEMENTS: Omnivorous. Summer diet consists primarily of insects (beetles, crickets, and grasshoppers). Also feed on bees, small mammals, frogs, berries, nuts, and grains.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use aboveground rest sites in spring, summer, and early fall, usually in dense cover. During late fall, underground dens are used more frequently and they may be used for an extended period during the winter. May also den under buildings.

Territory/Home Range

It is likely that males have territories while females are more tolerant of conspecifics. In Illinois, minimum home range sizes were 510 ha for adult males and 370 ha for adult females (Godin 1982).

Activity and Movement Patterns

Nocturnal and crepuscular. Do not hibernate but may have periods of inactivity during the winter. Dispersal of juveniles occurs in the fall.

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

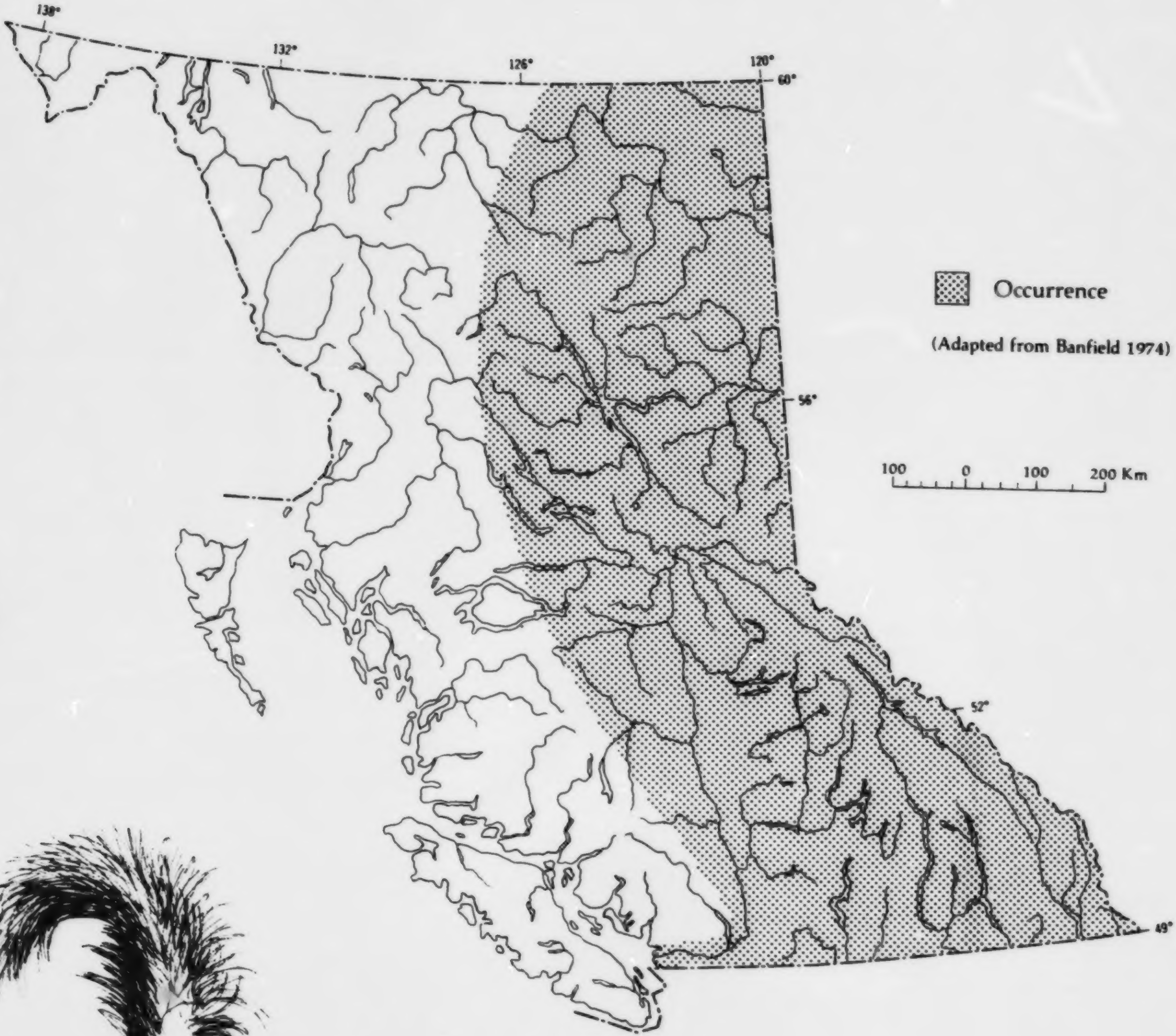
Other

May be a reservoir for rabies.

Selected References

Godin 1982; Maser *et al.* 1981; Rosatte and Gunson 1984; Verts 1967; Wade-Smith and Verts 1982.

Striped Skunk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(Adapted from Banfield 1974)

River Otter
LUCA
Lutra canadensis (Schreber)
[Canadian River Otter]

Distribution, Seasonality and Abundance

May be found along larger waterways throughout British Columbia but are more common along the coastal shoreline and offshore archipelagos. Population is estimated to be between 15 000 and 30 000 in British Columbia (Munro and Jackson 1979). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Require proximity to aquatic habitats (freshwater or marine).

SPECIFIC HABITAT ELEMENTS: Den close to water (0.8 km; Woolington 1984) in a sheltered spot such as cavities among tree roots, hollow logs, old beaver lodges, or under a rock.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in the water or on the land near aquatic habitats such as saltwater habitats close to shore, riverine, and lacustrine habitats.

SPECIFIC HABITAT ELEMENTS: Feed primarily on fish, but will also take amphibians, small birds, and rarely small mammals. On the coast, River Otters may prey on Glaucous-winged Gull chicks. In lake habitat, they may prey extensively on breeding and molting waterfowl (Gilbert and Nancekivell 1982).

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Live on land in sheltered dens under rocks or tree roots, in hollow logs, Beaver lodges, or a bank burrow of a Beaver or Muskrat. Resting dens are located near open water and feeding areas. Require cover, such as a dense shrub layer. Along the coast, prefer shoreline with a pond or stream nearby. Good Beaver habitat seems to be ideal for River Otter populations.

Territory/Home Range

Little evidence of territoriality. Males usually have large home ranges that may overlap. Females and family groups have smaller home ranges that also overlap and may be within a male's home range. In Idaho home ranges of 8-78 km of shoreline have been reported (Melquist and Hornocker 1983) but coastal home ranges tend to be smaller (Larsen 1983; Woolington 1984).

Activity and Movement Patterns

Primarily nocturnal but may be active in early morning and late afternoon. Active all year. Males may travel long distances overland during the breeding season.

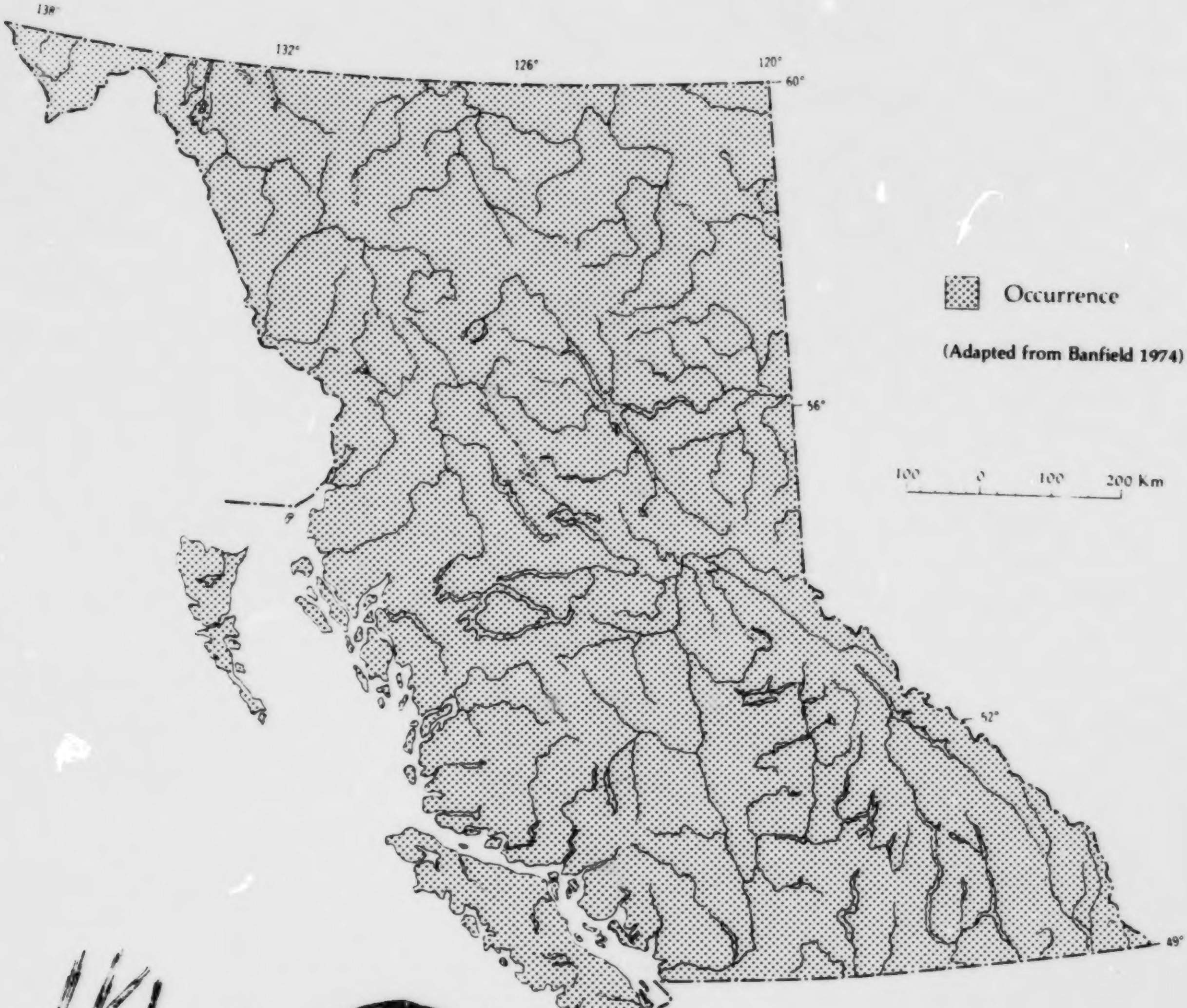
Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

Selected References

Gilbert and Nancekivell 1982; Larsen 1983; Maser *et al.* 1981; Melquist and Hornocker 1983; Munro and Jackson 1979; Stenson 1985; Toweill and Tabor 1982; Woolington 1984.

River Otter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(Adapted from Banfield 1974)

Cougar
FECO
Felis concolor Kerr
[Mountain Lion]

Distribution, Seasonality and Abundance

Occur in a variety of habitats from sea level to high elevations in the southern two-thirds of the province including Vancouver Island, which has one of the highest densities of Cougars in North America (Haley 1970). Provincial population is estimated at 3300 ± 20% (Goodchild *et al.* 1980a).

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats.

SPECIFIC HABITAT ELEMENTS: Prefer to den near water, either in a cave, under a rock ledge, or in a den protected by roots or a windfall. Seclusion is necessary, but no den preparation takes place. Kittens are usually born in summer and weaned at 3 months but may stay with the mother for 18 to 22 months. Females rarely mate unless they have found a permanent home range.

Habitat Requirements - Feeding

HABITAT CLASSES: Forested habitats; on Vancouver Island, tend to live in mature timber and hunt along forest edges while in the interior, prefer rough rocky semi-open areas near deer range.

SPECIFIC HABITAT ELEMENTS: Solitary hunters. Will feed on anything from Moose to mice, carrion, conspecifics, and vegetation; however, 60 to 80% of their diet is deer (Hancock 1980). Require 14 to 20 average sized Mule Deer per year (Spalding 1973); this decreases, however, if supplemented with other prey species. In the Okanagan, deer are the main winter food followed by Porcupine, Beaver, Snowshoe Hare, and domestic stock. In the Cariboo, deer and hares are equally important during peak of hare cycle. In the Kootenays, also prey on Rocky Mountain Bighorn Sheep and elk. Solitary animals in deep snow are the most vulnerable prey. Hunt in areas with easy access to prey and drinking water. In the winter, follow prey to lower elevations.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Prefer habitat with suitable cover such as dense vegetation, rocky ledges, or cliffs. Also prefer areas with no human interference.

Territory/Home Range

No apparent defense of home ranges, which are marked by defecation and urination on scratch piles. In unexploited areas, there is little overlap in home ranges. Males use larger home ranges than females: 65-90 km^2 versus 40-80 km^2 (Hancock 1980). Site attachment seems to be strong, especially among females, and home ranges are not easily expanded.

Activity and Movement Patterns

Usually hunt in twilight or darkness, remaining in cover during the day. Seasonal movements may occur depending on movements of prey population.

Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

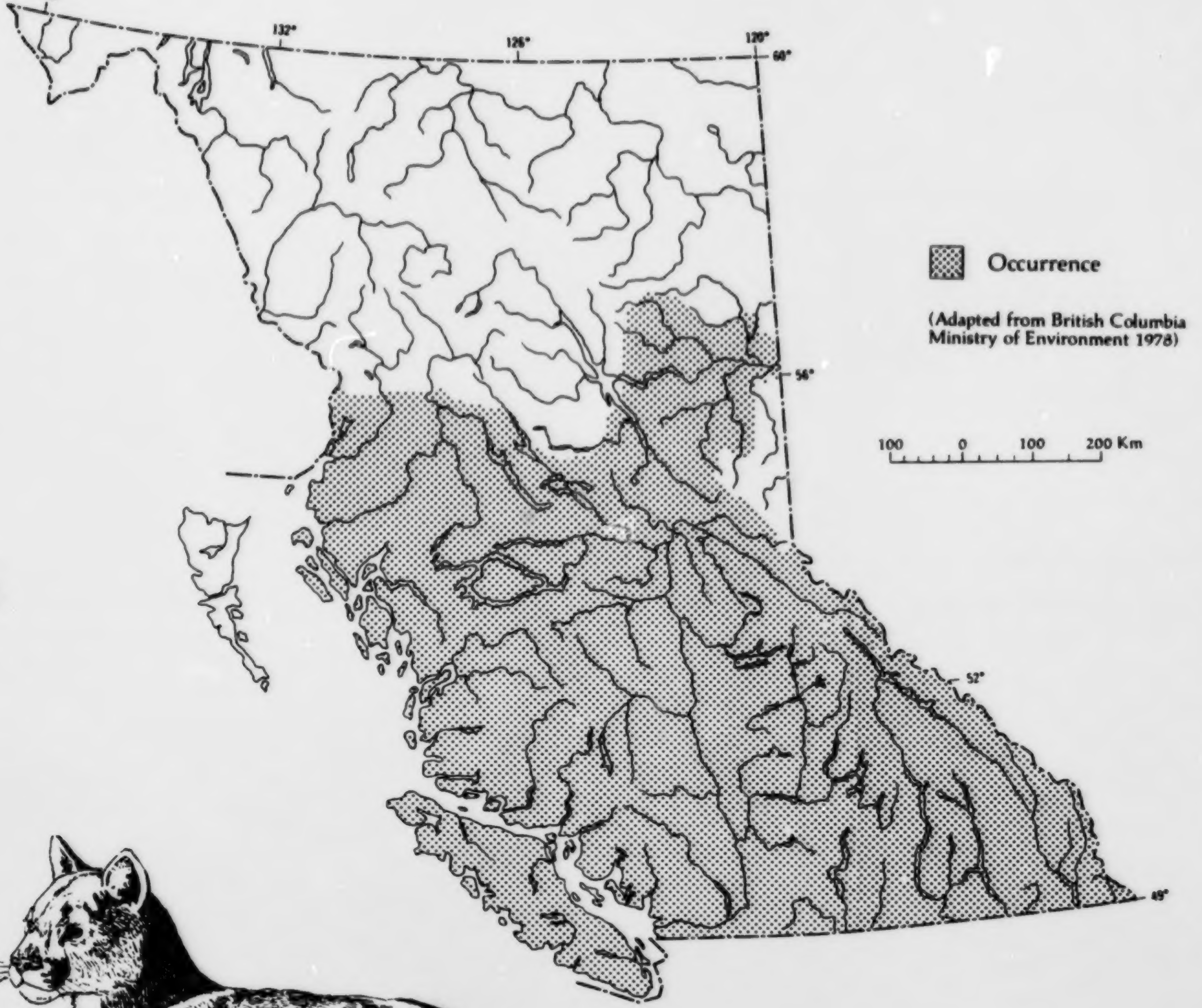
Other

Generally Cougars are not limiting to prey populations. May force wintering herds to disperse thus avoiding overutilization of one area by herbivores. Attacks on man are limited to dispersing young, starved, or rabid animals.

Selected References

Currier 1983; Goodchild *et al.* 1980a; Hancock 1980; Hornocker 1970.

Cougar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(Adapted from British Columbia Ministry of Environment 1978)

Lynx
LYCA
Lynx canadensis Kerr
[Canada Lynx]

Distribution, Seasonality and Abundance

Distributed throughout the province east of the Coast Range. More abundant in the north. Provincial population is estimated to vary between 20 000 and 250 000 (Goodchild and Munro 1980). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats; typically boreal white spruce forest, white spruce-subalpine fir forest, and boreal spruce-trembling aspen mixed forest.

SPECIFIC HABITAT ELEMENTS: Young are born in the spring in dens, usually in a hollow log, stump, windfall, or thicket.

Habitat Requirements - Feeding

HABITAT CLASSES: Hunt in good rabbit or hare habitat. Typically associated with extensive tracts of dense boreal forest interspersed with rocky outcrops, bogs, and thickets. Habitats such as boreal white spruce forests, boreal spruce - trembling aspen mixed forest, black spruce - tamarack bogs, young dense stands of lodgepole pine, sub-climax forests of alder - black spruce, and willow thickets are also important. When rabbit populations are high, may move into more open habitats. In the winter, select early and late successional habitats while in the summer, found in mature conifer habitat.

SPECIFIC HABITAT ELEMENTS: The Snowshoe Hare is the most important diet item, especially in winter. Will also feed on small mammals such as mice, voles, and squirrels as well as ptarmigan, grouse, carrion, and probably deer. Hunting success depends on good cover such as that found in advanced successional and closed conifer habitats for a close approach.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Frequently bed during daylight in thickets near game trails.

Territory/Home Range

Generally solitary. Home range size varies depending on prey density, sex, season, and climate. Males and females share a home range in the winter. In the summer, both sexes have larger home ranges, with the male home range extending beyond that of the female. In Montana, home range of a male Lynx was estimated at 36 km^2 (Koehler *et al.* 1979).

Activity and Movement Patterns

Active during the evening, but may also travel at night. In a Montana study, the female travelled farther each day than the male or juvenile with a mean daily cruising distance of 8 km (Koehler *et al.* 1979).

Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

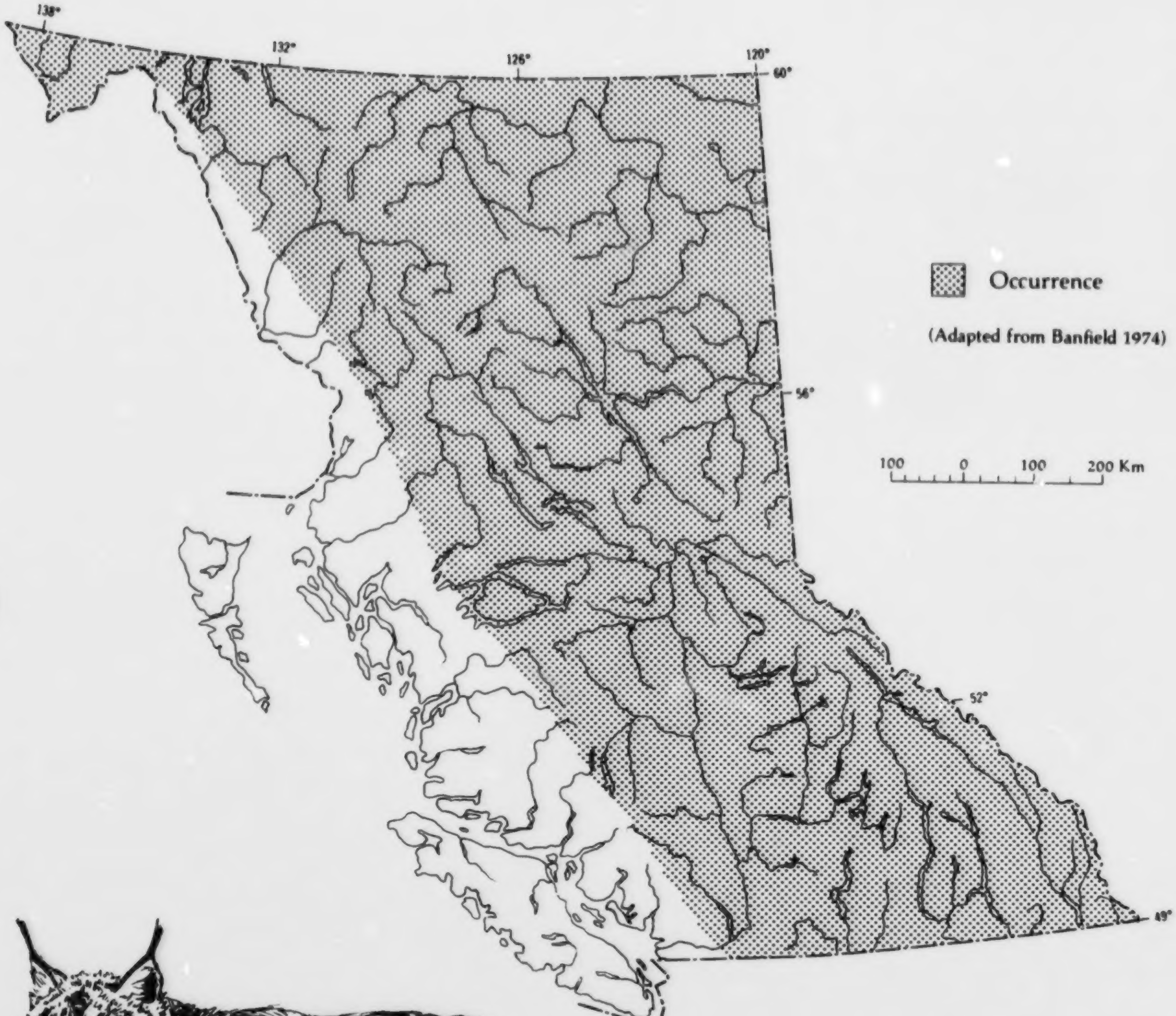
Other

Population levels are tied to Snowshoe Hare cycles with a periodicity of about 10 years. Increased timber harvest and a shorter rotation period may result in a proliferation of successional or second-growth stages that will benefit hare populations and therefore Lynx populations.

Selected References

Jorgensen and Mech 1971; Koehler *et al.* 1979; Nellis *et al.* 1972; Parker and Smith 1983; van Zyll de Jong 1966.

Lynx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Bobcat
LYRU
Lynx rufus (Schreber)
[Bay Lynx]

Distribution, Seasonality and Abundance

Distributed in the southern half of the mainland from sea level to timberline but prefer lower elevations. Absent from the Coast Range north of Bute Inlet. Provincial population is estimated at 5000 to 10 000 (Goodchild and Munro 1980). Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats such as western hemlock - Douglas-fir forests, Douglas-fir - ponderosa pine forests, and Engelmann spruce - subalpine forests.

SPECIFIC HABITAT ELEMENTS: Breed in the spring. Rocky ledges are used for courtship activity. Kittens born from late March to July in dens in caves, crevices, under logs, or secluded rocky, brushy areas. When kittens are big enough to follow, use temporary dens near hunting areas and move frequently.

Habitat Requirements - Feeding

HABITAT CLASSES: Forage in forested habitats, wetland habitats, and agricultural habitats.

SPECIFIC HABITAT ELEMENTS: Snowshoe Hares are the most important diet item in Minnesota (Bailey 1972) and Cape Breton Island (Parker and Smith 1983). Cottontails, small mammals, birds, reptiles, poultry, Porcupine, deer, and vegetation are also found in their diet. Sometimes cache or cover prey with whatever material is available. Hunt for prey in rocky or broken terrain with good cover for stalking. One study found that Bobcats intensively used recently logged areas because logging practices provided food and cover for prey species (Miller and Speake 1978).

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Rock piles and broken rocky ledges are used for refuge, breeding, raising young, and shelter from climatic extremes. Also use dense stands of brush, low-hanging conifer boughs, hollow trees and logs as rest areas and thermal cover. Movements are restricted in deep snow, making hunting difficult.

Territory/Home Range

In Idaho, the size of home ranges varied from 2.6 km^2 to 107 km^2 (Bailey 1974). Resident females maintained exclusive home ranges while male home ranges overlapped with each other and those of females.

Activity and Movement Patterns

Primarily nocturnal, but may be active at any time of day. Active all year. Dispersal of juveniles occurs in late fall or early spring of second year.

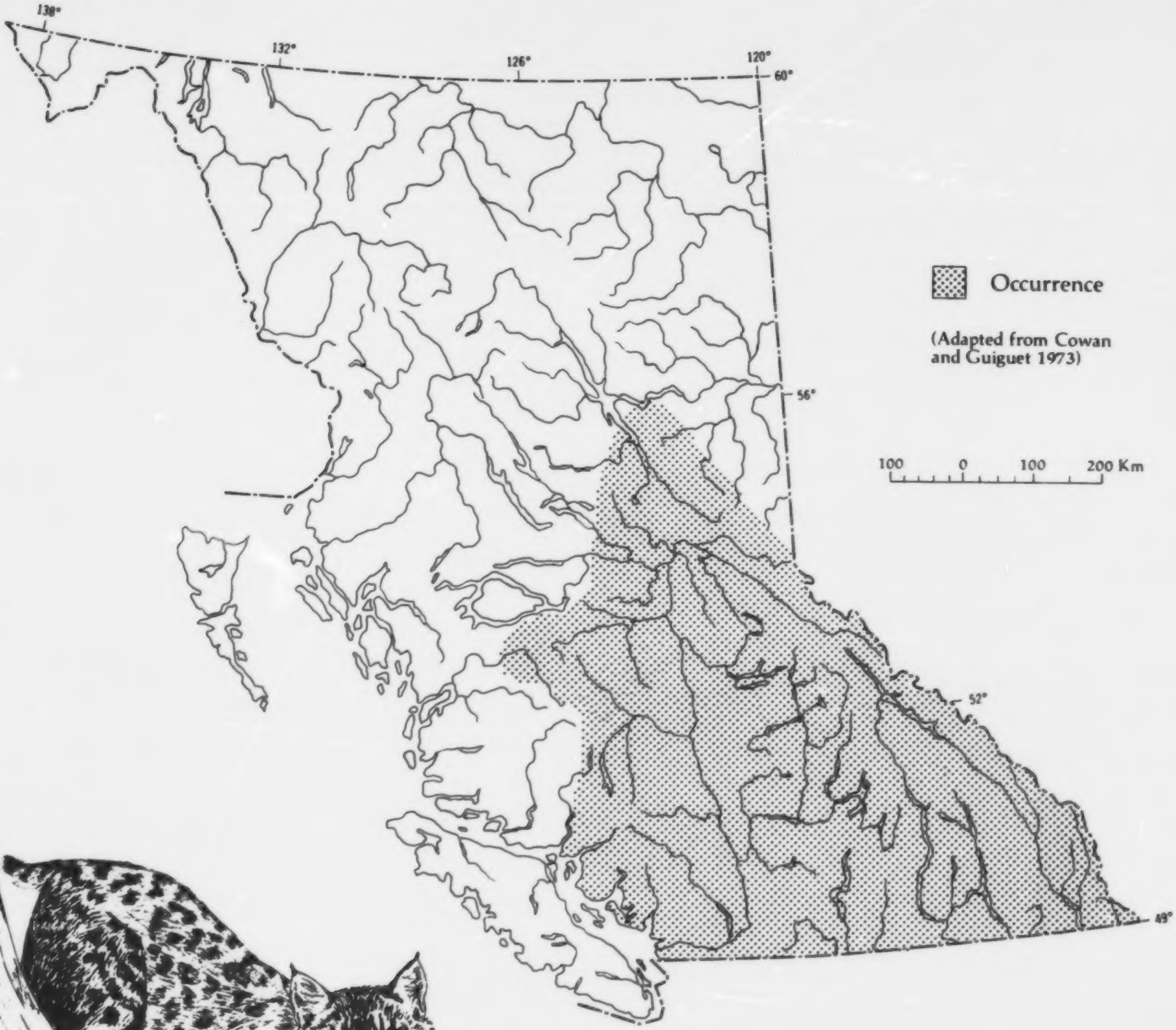
Status

Not in jeopardy. Protected as a furbearer under the British Columbia Wildlife Act (1982).

Selected References

Bailey 1972; Goodchild and Munro 1980; Provost *et al.* 1973; Young 1958.

Bobcat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(Adapted from Cowan and Guiguet 1973)

Rocky Mountain Elk
CEEL
Cervus elaphus nelsoni V. Bailey
[Wapiti]

Distribution, Seasonality and Abundance

Most abundant in the East Kootenays and Muskwa areas. Relict populations in interior of the province. Introduced herds established near Penticton, Princeton, Grand Forks, Lytton, Adams Lake, McNab Creek (may now be extinct), and Graham Island. Yearlong resident. British Columbia population is estimated to be about 21 000 ± 20% (Petticrew *et al.* 1981).

Habitat Requirements - Reproduction

HABITAT CLASSES: Terrain and availability of cover is more important than the vegetation class.

SPECIFIC HABITAT ELEMENTS: Breed from early September through early October. Rutting occurs in forest openings. Calving occurs in late June, between summer and winter ranges. Optimum calving grounds are on gentle terrain with escape and thermal cover (usually dense shrub and/or closed canopy coniferous forest) for the cow and hiding cover (shrubs, windfalls, logs) for the calf. Nearby foraging areas and water must also be available.

Habitat Requirements - Feeding

HABITAT CLASSES: Elk have a broad tolerance of successional stage and cover type. They forage in a variety of habitats including Douglas-fir -ponderosa pine forests, Douglas-fir - lodgepole pine forests, ponderosa pine parkland, Engelmann spruce - subalpine fir forests, interior subalpine parkland, trembling aspen forests, deciduous riparian forests, subalpine wet meadows, avalanche shrubland, and boreal and southern bunchgrass steppe. Prefer early successional stages and forage in natural forest openings, avalanche tracts, cutovers, burns and roadsides, often at higher elevations in the summer.

SPECIFIC HABITAT ELEMENTS: Primarily grazers, preferring grasses and forbs. In the winter, snow cover affects the availability of forage and they may be forced to feed on shrubs and deciduous trees. South slopes with low snow cover are especially important in the winter.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Elk require escape and thermal cover. Escape cover has been defined as vegetation over 2 m with a stem density of between 50 and 2000 stems per ha (McNamee *et al.* 1981) or vegetation capable of hiding 90% of an elk from view of a human at 61 m (Black *et al.* 1976). Good thermal cover consists of coniferous trees 12 m or higher with a crown cover of greater than 70% (Black *et al.* 1976). Low vegetation that restricts air movements is desirable. Some mature timber capable of intercepting snow is essential for survival during winters of heavy snowfall. Make use of mineral licks.

Habitat Requirements - Pattern

Require cover adjacent to forage sites. Optimal habitat has open areas interspersed with patches of trees or dense shrubs.

Territory/Home Range

Elk are herding animals. The yearly cruising radius averages 24-72 km with a maximum of 56-192 km (British Columbia Provincial Museum 1946). Home range size is variable as some elk are resident while others are highly migratory between seasonal ranges.

Activity and Movement Patterns

Crepuscular tending to nocturnal when disturbed by humans. Generally forage in the early morning and late afternoon and spend the middle part of the day resting and ruminating. Often migrate to and from summer and winter ranges along habitual trails. Males are more likely to disperse from their natal range than females.

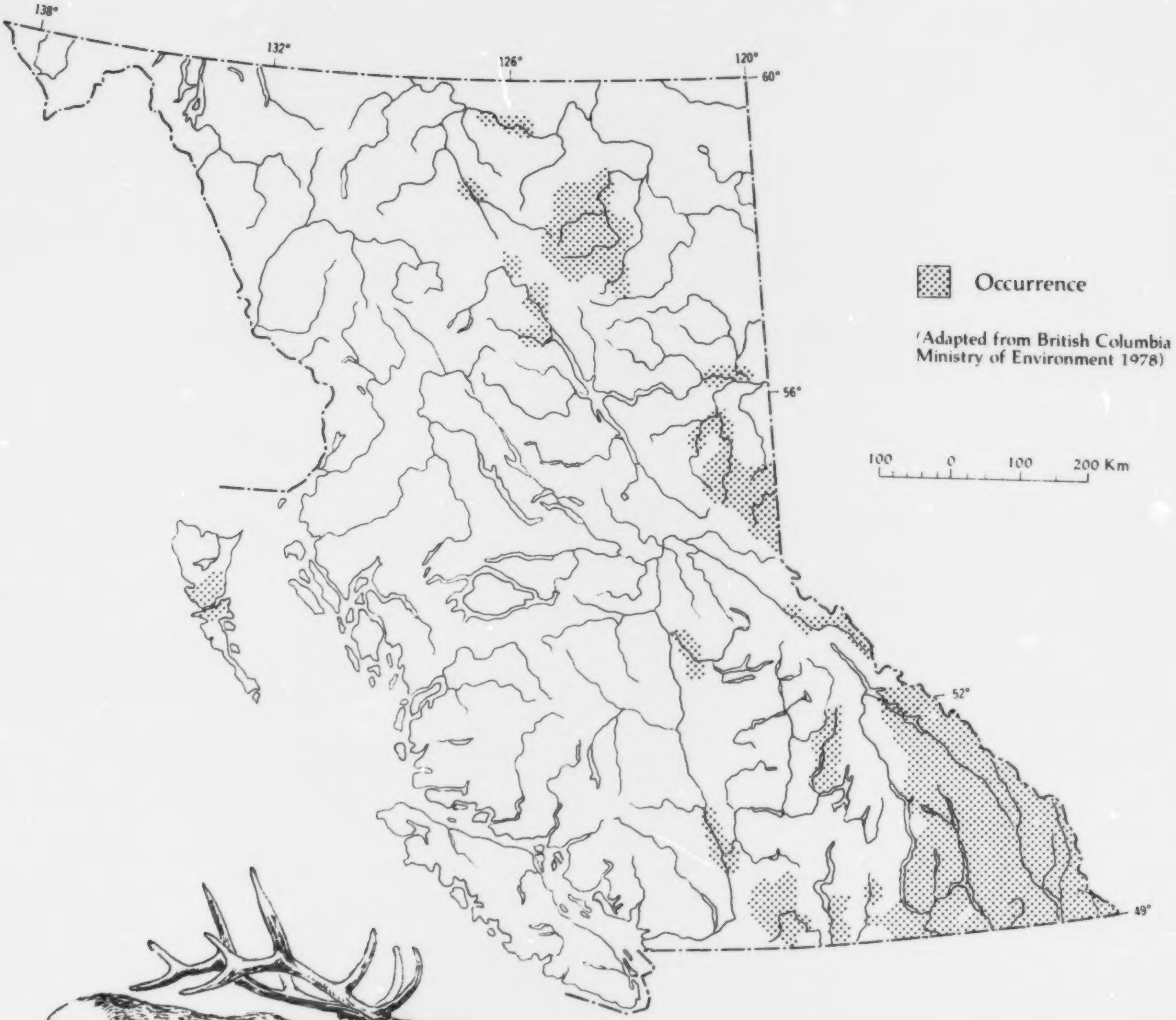
Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

Selected References

Boyce and Hayden-Wing 1973; Churchill 1982; Leege 1984; McLellan 1978; Petticrew *et al.* 1981; Thomas and Toweill 1982.

Rocky Mountain Elk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(Adapted from British Columbia Ministry of Environment 1978)

Mule Deer
ODHE
Odocoileus hemionus hemionus (Rafinesque)

Distribution, Seasonality and Abundance

Mule deer are distributed throughout much of the province east of the Coast Range to the Alberta border. They are most common in the southern interior and Peace River area and absent or rare in coastal forests and the northwestern portion of the province. Native yearlong resident. The provincial mule deer population is estimated at 125 000 ± 20% (D. Low, pers. comm.).

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats. Need for cover is important.

SPECIFIC HABITAT ELEMENTS: Rut occurs between mid-October and December, peaking in early November. Fawns are usually born in June. Seek secluded area for fawning. Fawns remain in one spot for the first few days, usually in dense cover. Optimum fawning habitat has low shrubs or small trees from 0.6 to 1.8 m under a tree overstory of approximately 50% crown closure with good foraging areas nearby (Thomas *et al.* 1979).

Habitat Requirements - Feeding

HABITAT CLASSES: Broadly adapted and found in many habitats. Prefer open coniferous forests and early seral stages. Winter range includes Douglas-fir forests, ponderosa pine parkland, Engelmann spruce - subalpine fir forests, trembling aspen forests, southern bunchgrass steppe, and sagebrush steppe. Summer ranges are sometimes at higher elevations, usually moister areas, and include interior subalpine parkland, alpine/subalpine wet meadows, and alpine tundra.

SPECIFIC HABITAT ELEMENTS: Specific foods eaten by mule deer are extremely varied. Feed on forbs, shrubs, trees, grasses, and fungi with the relative use of each group dependent upon season and habitat. Douglas-fir, trembling aspen, birches, ceanothus species, huckleberry, red-osier dogwood, saskatoon, willows, antelope-brush, forbs such as clover and fireweed, grasses, and mushrooms are a few of the food items eaten. Usually, winter diet is predominantly woody browse. Mule deer utilize forest edges, burns, logged areas and areas with steep, broken terrain. During the winter, deer concentrate in areas of lower snow depth. Climax forest is required in regions of severe climate. Preferred winter range has abundant forage on recently disturbed moisture receiving areas, interspersed with stands having mature canopy.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Snow depths of 25-30 cm may impede movements (especially young animals), while depths of more than 50 cm precludes use of an area (Loveless 1967). Shrubs, thickets, and trees provide bedding sites and thermal cover. Often utilize rugged terrain to outmaneuver predators. Use mineral licks, especially in spring.

Habitat Requirements - Pattern

Juxtaposition of a variety of habitat types is required to meet the needs of mule deer for a diversity of plant species as food and for hiding, escape, thermal cover, and shelter from deep snow.

Territory/Home Range

Relatively gregarious. Small groups of does or bucks may form in summer. May form larger loose groups on winter range. Dominant bucks establish territories during the rut. Home range size varies widely between individuals, sexes, and habitat occupied. Generally, bucks use larger areas and winter ranges are smaller than summer ranges. Use of seasonal ranges is often traditional.

Activity and Movement Patterns

Usually active in early morning and evening. Seasonal migrations may occur, especially in mountainous regions. Usually, these migrations are to higher altitudes in summer and to areas of lower snowfall in winter. Movements of up to 120 km between seasonal ranges have been recorded in the Cariboo (H. Armleder, pers. comm.).

Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

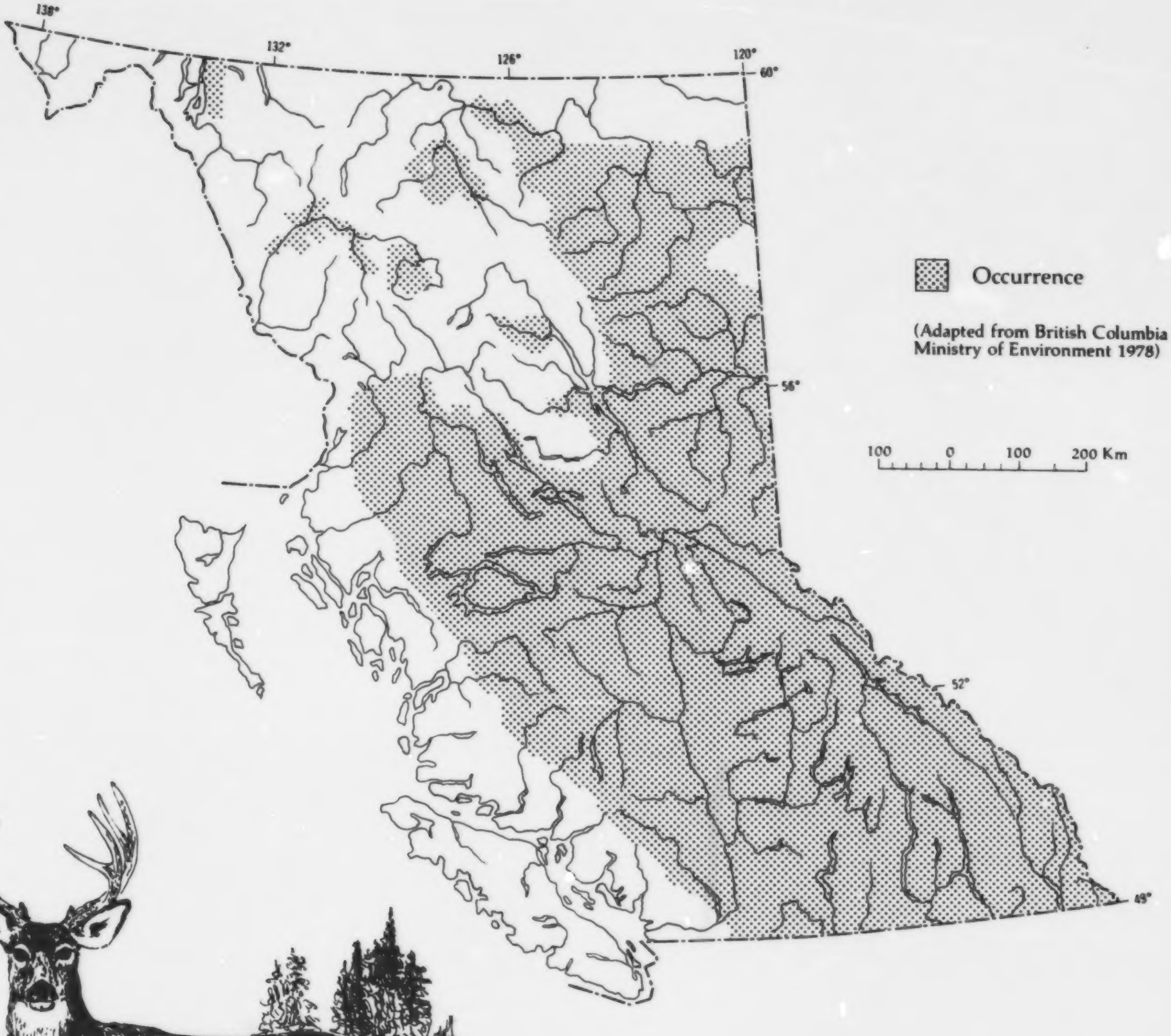
Other

Forest fire protection policies coupled with maturation of early seral stage range have resulted in the deterioration of deer habitat in many areas. In the Cariboo, logging of winter ranges and land alienation have caused habitat destruction. In some areas, highways and railways cause high collision mortality.

Selected References

Deschamp *et al.* 1979; Morrison 1972; Petticrew and Jackson 1980; Wallmo 1981; Willms *et al.* 1976.

Mule Deer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(Adapted from British Columbia Ministry of Environment 1978)

White-tailed Deer
ODVI
Odocoileus virginianus (Zimmerman)
[Whitetail Deer]

Distribution, Seasonality and Abundance

Distributed in two disjunct regions of British Columbia: the Peace River area and the southeastern portion of the province, particularly the lower valleys of the Kootenay, Columbia, Kettle, and Okanagan. Provincial population is estimated to be 25 000 ± 20% (Petticrew and Jackson 1980). Native yearlong resident. Considerable interchange with Washington, Idaho, and Montana.

Habitat Requirements - Reproduction

HABITAT CLASSES: Forested habitats. Need for cover more important than habitat class.

SPECIFIC HABITAT ELEMENTS: Breeding occurs in late November-early December and fawns are born in late May June. Parturition sites are usually on gentle slopes with abundant cover such as dense shrubs or tall grass.

Habitat Requirements - Feeding

HABITAT CLASSES: Preferred foraging areas are small openings (1-3 ha) in forested habitats such as Douglas-fir - ponderosa pine forests, Douglas-fir - lodgepole pine forests, trembling aspen forests, and deciduous riparian forests. Cultivated forage crops often replace native forage and, where cover is ideal, may be preferred.

SPECIFIC HABITAT ELEMENTS: Primarily browsers, feeding on shrubs but they also eat grasses, forbs, fruits, mushrooms, and agricultural crops. Douglas-fir needles comprise up to 33% of the winter diet in the East Kootenay. Diet varies according to season and availability. Require nearby cover and often forage in ecotones between open and forested areas. Also utilize clear cuts and burns. In winter they concentrate in areas of lower snow depth with southerly exposure and valley bottom slopes and benchlands with conifer cover. In spring, often disperse to valley bottoms at low to middle elevations and large riparian zones.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Require resting, hiding, and thermal cover. Shrubs and thickets supply bedding sites and trees reduce snow levels and provide thermal cover. Also make use of aspect to modify climatic extremes.

Habitat Requirements - Pattern

Forage and cover areas must be in close proximity. Suitable winter range with reduced snow levels must be accessible.

Territory/Home Range

White-tailed Deer have the smallest home range of any wild ruminant. In the northern United States, home range sizes have been reported to be between 0.67 km^2 and 2.5 km^2. In the East Kootenay, winter home range size averaged 2.79 km^2 and summer home ranges were less than 2.0 km^2 (Smith 1977). Pend d'Oreille deer had winter home range sizes from 2.0-3.6 km^2 and summer home range sizes from 2.8-9.1 km^2 (Woods 1984). Size is generally dependent on the quality of available food and cover. Dispersal to winter ranges averaged 2.4 km and was as far as 65 km in the East Kootenay (Smith 1977). Territoriality has been observed in females after parturition. During the rut, males often move several kilometres outside their home range.

Activity and Movement Patterns

Daily activity pattern consists of a morning feeding period, mid-morning to mid-afternoon bedding period, and a late afternoon to evening moving and feeding period. Juveniles disperse at 1 year of age. Populations are split between resident and migratory animals. Seasonal migrations are usually altitudinal.

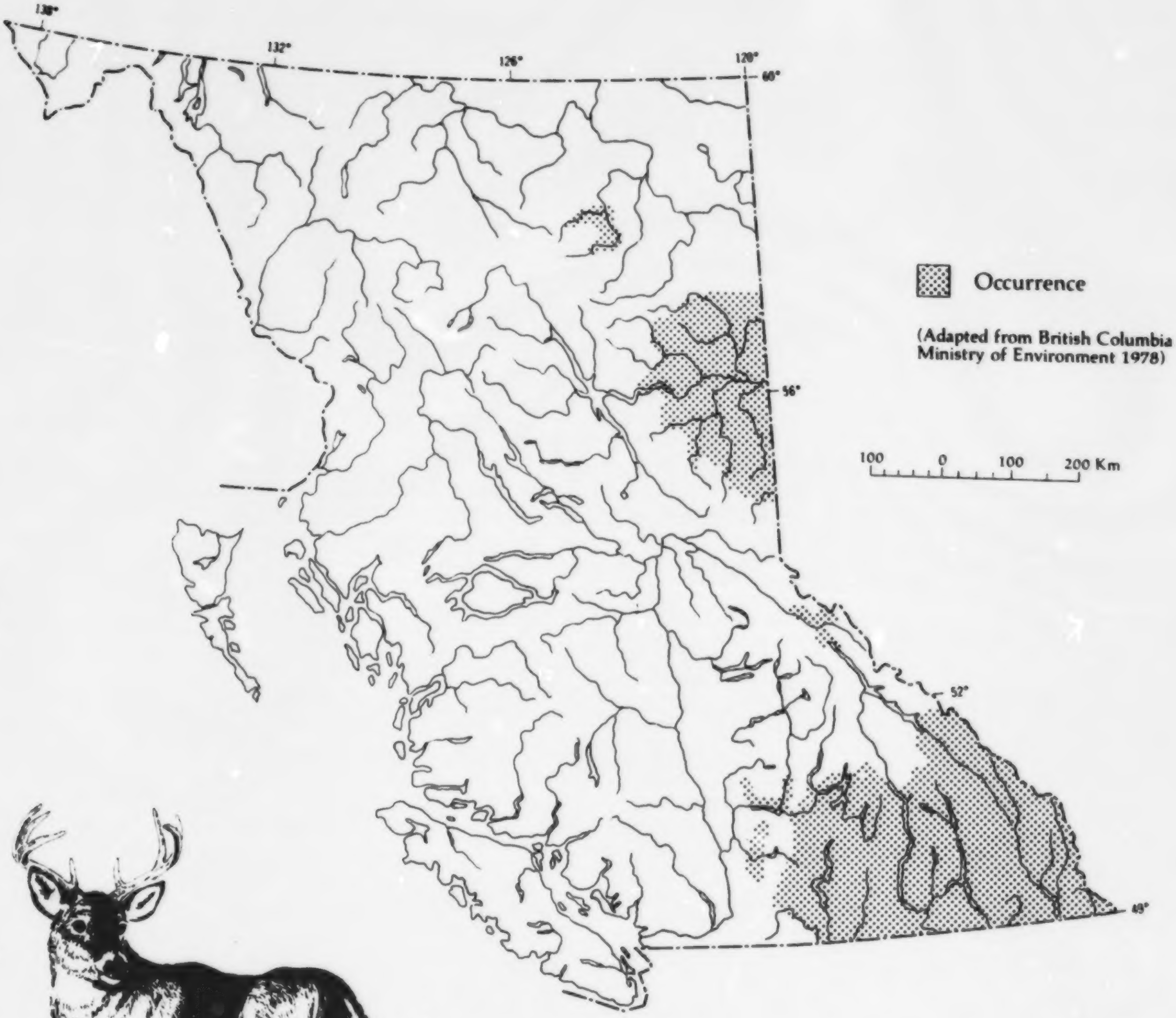
Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

Selected References

Demarchi and Demarchi 1967; Halls 1978; Kramer 1972; Martinka 1968; McCullough 1979; Petticrew and Jackson 1980.

White-tailed Deer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(Adapted from British Columbia Ministry of Environment 1978)

Moose
ALAL
Alces alces (Linnaeus)
[American Moose]

Distribution, Seasonality and Abundance

Widespread throughout mainland of the province, excluding coastal areas and the arid region centred in the Okanagan Valley. Most abundant in the central and northern portion of the province. Native yearlong resident. The population in British Columbia is estimated at 240 000 ± 20% (Petticrew and Munro 1979a).

Habitat Requirements - Reproduction

HABITAT CLASSES: Moose tend to rut in semi-open areas, commonly adjacent to forest openings. Calving usually occurs in forested or riparian habitats. (See feeding requirements for a more complete description).

SPECIFIC HABITAT ELEMENTS: Most breeding occurs from late September through early October. Bulls and cows wallow in rutting pits, which are often located in wet areas. Calving occurs in late May or early June usually in dense cover such as thickets. Calves are helpless at birth and remain in seclusion for a few days.

Habitat Requirements - Feeding

HABITAT CLASSES: Prefer semi-open successional stages of forested habitats with abundant browse. Boreal white spruce forests, white spruce -subalpine fir forests, wet interior white spruce forests, deciduous riparian forests, boreal spruce - trembling aspen mixed forests, trembling aspen forests, and birch - willow scrub parkland are important but other forested habitats such as Engelmann spruce - subalpine fir forests and Douglas-fir - lodgepole pine forests are also used. Mature forested habitats, wetland habitats, avalanche shrubland, and alpine/ subalpine meadows with gentle terrain are important in the summer.

SPECIFIC HABITAT ELEMENTS: In winter, feed primarily on the twigs of shrubs and trees such as willows, red-osier dogwood, paper birch, trembling aspen, cottonwood, poplar, yew, and subalpine fir. Aspen bark may also be eaten, especially in late winter. In summer, feed mainly by stripping leaves from deciduous trees or shrubs. Browse is supplemented with aquatic plants, some grasses, sedges, and tall forbs. Moose will utilize cutovers and burns if abundant browse is present. Usually winter in areas of lower snow depth in floodplains or uplands, depending on the area. In summer, some moose range into higher elevations and wetland habitats.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Areas with climates having temperatures that exceed 27C for long periods and lack shade, do not support moose (Kelsall and Telfer 1974). Settled snow depths of over 80 cm seriously impede movement, therefore moose usually winter in areas where snow depths are below this (Franzmann 1981). Mature timber may serve as winter and summer thermal cover or provide foraging areas in the shallow snow under the canopy. Dense stands of trees may also supply escape cover. Bedding sites are usually in forests or adjacent to forest edge, but may be in more open areas close to foraging sites. Mineral licks are often used, especially in the summer.

Habitat Requirements - Pattern

Optimum moose habitat consists of patches of seral shrubby growth interspersed with more mature timber for cover. For example, the discontinuity of a fire or the habitat mosaics created by timber harvest enhance 'edge effect', which increases the diversity of plant species and staggers the maturation rate of various seral stages.

Territory/Home Range

Solitary in areas of low density, but common in small groups elsewhere. Not territorial except in rut, however cows will defend calves. Seasonal home ranges are small in some areas, averaging 5-10 km^2, with bull home ranges being the largest (LaResche 1974). In British Columbia, average seasonal moose ranges are much larger: summer, male: 218.9 ± 38 ha, female: 615.2 ± 629.4 ha; fall, male: 997.3 ± 668.1 ha, female: 738.3 ± 825.4; winter, male: 576.5 ± 365.8 ha, female: 596.2 ± 450.9 ha (Schwab 1985). Generally retain the same home range year after year.

Activity and Movement Patterns

May be active at any time during the day and night. Peaks of foraging activity usually occur at dawn and dusk. May migrate long distances from summer continued on page to winter ranges depending on browse availability and snow depth. This migration usually includes use of high altitude habitats in the summer with habitats at lower elevations preferred in winter.

Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

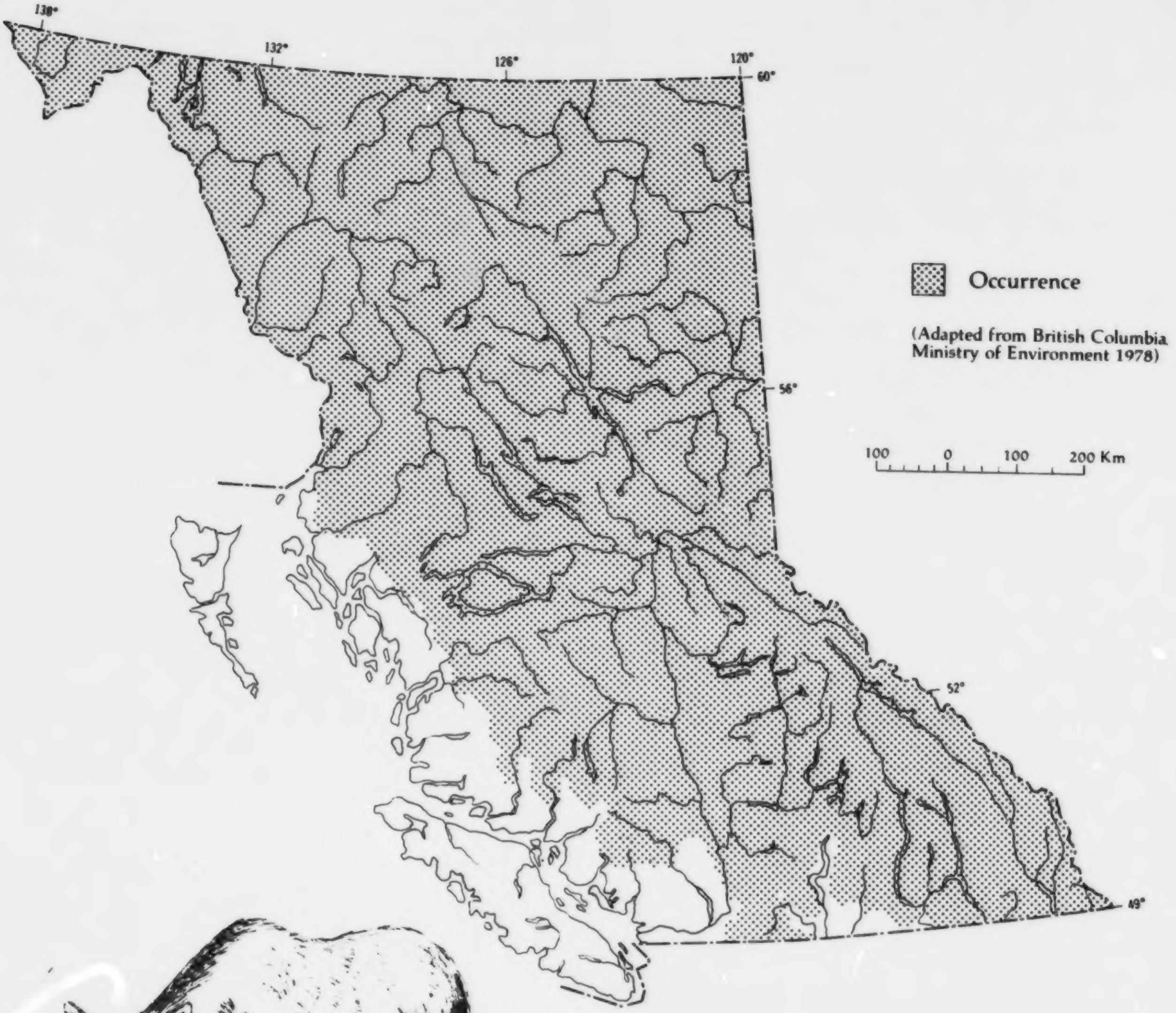
Other

During periods of restrictive snow cover (greater than 90-100 cm), moose often utilize railways and highways for travel routes, resulting in many moose/vehicle collisions. High populations of moose may cause serious damage to forest plantations. Fire protection policies have often resulted in decreased quality and diversity of moose habitat in many areas.

Selected References

Eastman 1974; Franzmann 1981; Fuhr and Pendergast 1983; Geist 1963; Peterson 1955; Petticrew and Munro 1979a; Silver 1976.

Moose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(Adapted from British Columbia Ministry of Environment 1978)

Mountain Goat
ORAM
Oreamnos americanus
[de Blainville]

Distribution, Seasonality and Abundance

Distributed throughout suitable habitats on the mainland of British Columbia. Most abundant in Rocky Mountains, scattered coastal mountain populations, and northern mountains and plateau. Native yearlong resident.

Habitat Requirements - Reproduction

HABITAT CLASSES: Widespread habitat use for breeding. Birth areas in a variety of habitats ranging from coastal Douglas-fir - western hemlock and boreal spruce forests to alpine tundra; more dependent upon suitability of terrain than vegetation class.

SPECIFIC HABITAT ELEMENTS: Rocky cliffs or bluffs.

Habitat Requirements - Feeding

HABITAT CLASSES: Select habitat more for its topographical features than for available forage. Feed in a variety of habitats adjacent to cliffy areas such as alpine tundra, alpine/ subalpine wet meadows, coastal subalpine parkland, interior subalpine parkland, talus shrublands, and subalpine forest burns. Goats may feed in lower coniferous forests during winter in wet snow areas, or may use windswept ridges in dry interior locations.

SPECIFIC HABITAT ELEMENTS: Generalist herbivores. Interior summer diet primarily graminoids, while coastal goats eat shrubs with lesser amounts of graminoids. Winter diet mainly twigs of shrubs and trees and both arboreal and terrestrial lichens. May travel outside usual spring or summer home range to mineral licks.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Use rocky cliffs as escape terrain. Variety of microclimates desirable for thermoregulation, including snow or ice, steep forested areas, north-and south-facing rocky bedding sites, and feeding sites.

Habitat Requirements - Pattern

Important to have good foraging sites adjacent to rocky cliff areas, especially for nannies and kids in early summer. Coastal populations usually require close proximity winter range.

Activity and Movement Patterns

Diurnal, with avoidance of direct solar radiation during hot periods in summer. Active all year. Local migrators, especially in coastal populations.

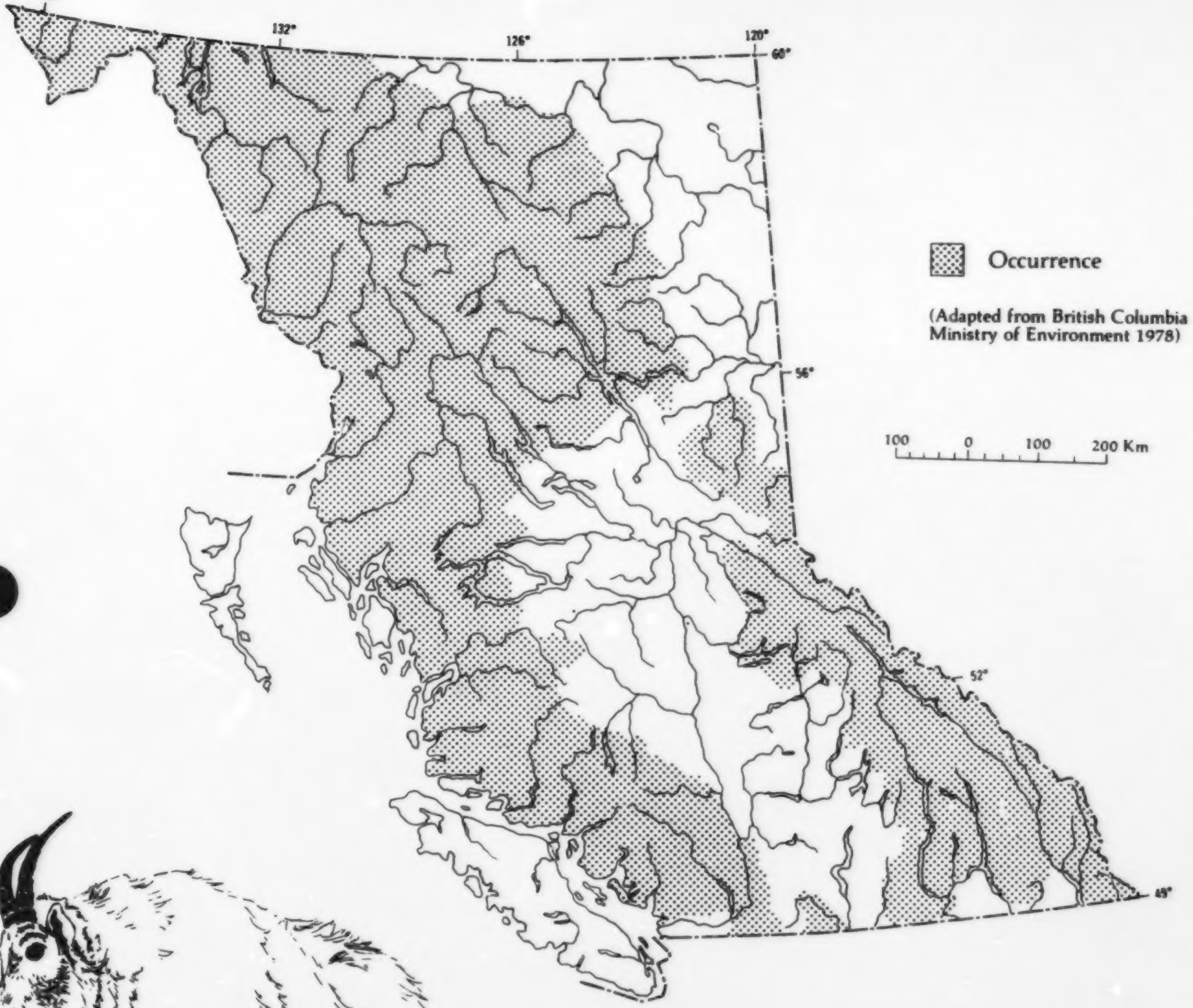
Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

Selected References

Chadwick 1976; Cowan and McCrory 1970; Foster 1984; Hebert and Turnbull 1977; Hjeljord 1971; Stevens 1983.

Mountain Goat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(Adapted from British Columbia Ministry of Environment 1978)

Bighorn Sheep
OVCA
Ovis canadensis Shaw
[Mountain Sheep]

Distribution, Seasonality and Abundance

Two subspecies occur in British Columbia: Rocky Mountain and California. Rocky Mountain Bighorn Sheep are distributed along the Rocky Mountains and Rocky Mountain Trench from the United States border to Golden and in scattered bands from Mount Robson to the Sukunka River. Two bands have been introduced into unoccupied California Bighorn Sheep ranges at Squilax and Spences Bridge. California Bighorn Sheep occur in the Okanagan, Similkameen, and mid-Fraser River basin areas. Re-introduced herds are established near Kamloops Lake and near Grand Forks. Bighorn Sheep are native yearlong residents. Population estimates are 1800 ± 200 for California Bighorn Sheep and 1200 ± 100 for Rocky Mountain Bighorn Sheep (B.C. Ministry of Recreation and Conservation 1978).

Habitat Requirements - Reproduction

HABITAT CLASSES: Suitability of terrain is more important than habitat. Usually associated with areas of low precipitation.

SPECIFIC HABITAT ELEMENTS: Mating occurs from October to early December, depending on location. It usually occurs on flat or gentle slopes of open grassland, seral-shrublands, or alpine-like areas. Lambs are born from April to early June. Lambing commonly occurs in rugged, precipitous terrain, adjacent to adequate forage and water. Cliffs and rock outcroppings with a sparse cover of trees and shrubs provide thermal and hiding cover for ewes and newborn lambs.

Habitat Requirements - Feeding

HABITAT CLASSES: California Bighorn Sheep summer range occurs in alpine tundra, alpine/subalpine wet meadows, avalanche shrubland, sagebrush steppe, and southern bunchgrass steppe. Winter ranges are usually below 1800 m in sagebrush and southern bunchgrass steppe; however some populations may remain in the subalpine/alpine. Most Rocky Mountain Bighorn Sheep spend the summer above 2100 m in alpine/ subalpine wet meadows and alpine tundra. In winter, they migrate downwards to open, early seral stage areas within conifer-dominated habitats, usually along lower mountain slopes, windswept ridges, and southwest slopes. Some populations winter on high elevation, windswept, alpine-like ridges and steep slopes.

SPECIFIC HABITAT ELEMENTS: Feed primarily on grasses and sedges, and, to a lesser extent, on forbs, but will also eat shrubs, depending on availability. Access to water and mineral licks are essential.

Habitat Requirements - Special Needs

SPECIFIC HABITAT ELEMENTS: Steep broken cliffs with traversable terraces, steep slopes, ridge tops, and talus are used for escape and bedding. In the summer, subalpine forests may also be used for cover. Cliffs, rocky outcroppings, caves, trees, and shrubs provide protection from climatic extremes. Winter ranges are usually on south-to west-facing aspects.

Habitat Requirements - Pattern

Foraging areas must be located near escape terrain (usually within 0.8 km) and less than 1.6 km from water (Van Dyke *et al.* 1983). Free water is not essential during the snowy season. Range must include or be close to suitable lambing areas.

Territory/Home Range

Not territorial. Tend to live in groups; rams over 3 years usually segregate into separate bands from ewes and young. Winter range size can be smaller than summer range when mobility is limited by snow.

Activity and Movement Patterns

Diurnal with from 1 to 6 peaks of feeding activity/day depending on season. Major activity peaks usually occur around dawn and dusk. A few herds are yearlong residents on a given range while most other herds migrate from 2-60 km between summer and winter ranges. Usually avoid heavily timbered areas but move quickly when forced to cross them, adhering to streambeds where possible.

Status

Not in jeopardy. Protected as big game under the British Columbia Wildlife Act (1982).

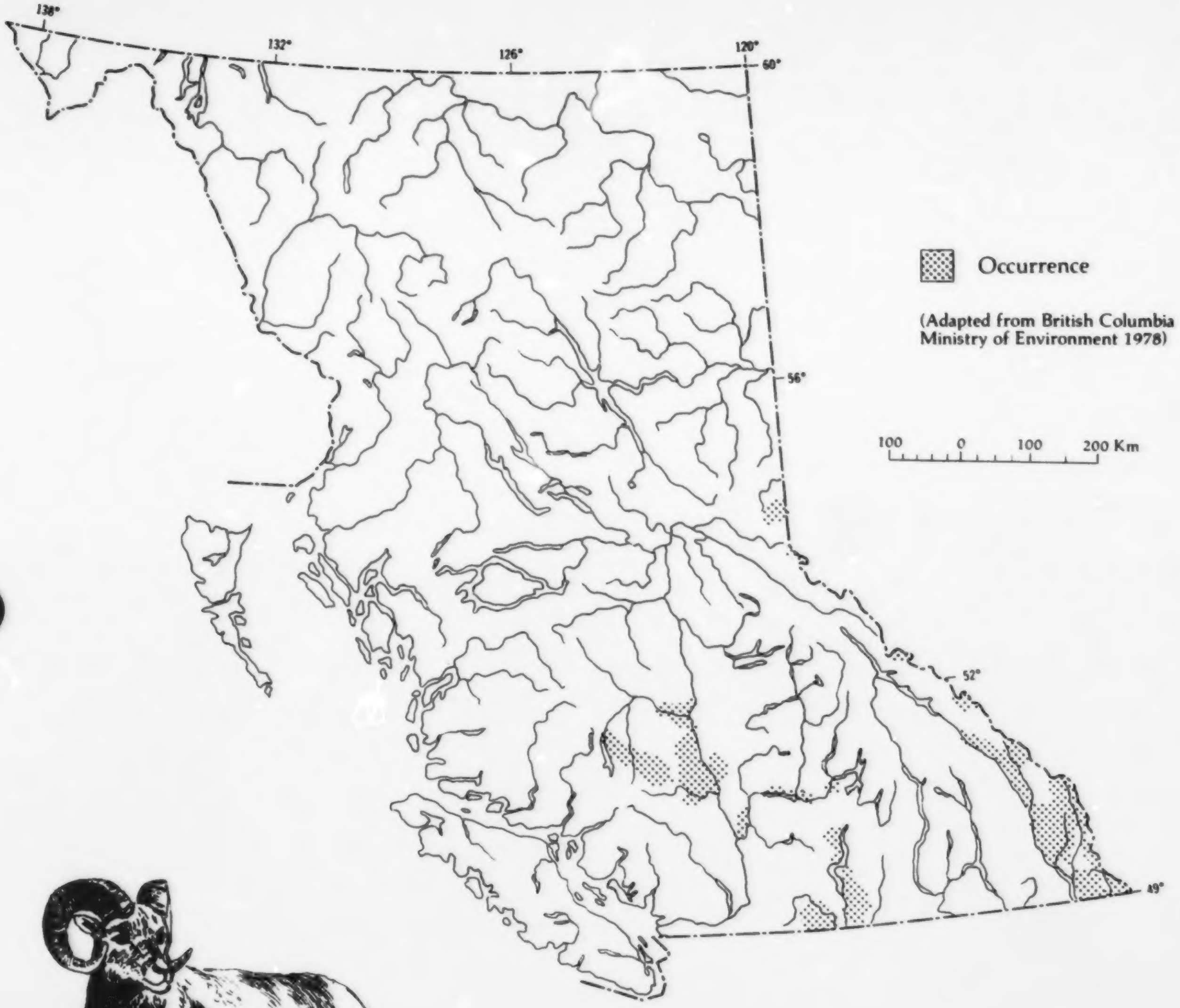
Other

Human activity in open habitat can cause sheep to reduce or terminate their use of a particular area. Particularly susceptible to disturbance during lambing.

Selected References

Demarchi and Mitchell 1973; Geist 1971; Shackleton 1985; Stelfox 1976; Sugden 1961; Van Dyke *et al.* 1983.

Bighorn Sheep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(Adapted from British Columbia Ministry of Environment 1978)

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4

Index to Species

4. INDEX TO SPECIES

Alces alces 142, 143,
American Badger 124, 125
American Beaver 70, 71
American Black Bear 106, 107
American Marten 112, 113
American Mink 120, 121
American Moose 142, 143,
American Pika 44, 45
American Porcupine 98, 99
American Red Squirrel 62, 63
American Water Shrew 16, 17
Antrozous pallidus 40, 41
Badger 124, 125
Badger, American 124, 125
Badger, Yellow 124, 125
Bat, Big Brown 34, 35
Bat, California 28, 29
Bat, Fringed 24, 25
Bat, Hoary 36, 37
Bat, Little Brown 18, 19
Bat, Long-eared 22, 23
Bat, Long-legged 26, 27
Bat, Pallid 40, 41
Bat, Silver-haired 32, 33
Bat, Small-footed 30, 31
Bat, Spotted 38, 39
Bat, Townsend's Big-eared 42, 43
Bat, Western Big-eared 42, 43
Bat, Yuma 20, 21
Bay Lynx 134, 135
Bear, American Black 106, 107
Bear, Black 106, 107
Bear, Brown 108, 109
Bear, Grizzly 108, 109
Beaver 70, 71
Beaver, American 70, 71
Big Brown Bat 34, 35
Bighorn Sheep 146, 147
Black Bear 106, 107
Bobcat 134, 135
Bog-lemming, Northern 90, 91
Boreal Redback Vole 78, 79
Brown Bear 108, 109
Bushy-tailed Woodrat 76, 77
California Bat 28, 29
California Myotis 28, 29
Canada Lynx 132, 133
Canadian River Otter 128, 129
Canis latrans 102, 103
Canis lupus 100, 101
Cascade Golden-Mantled Ground Squuirrel 60, 61
Cascade Mantled Groundsquirrel 60, 61
Castor canadensis 70, 71
Cervus elaphus nelsoni 136, 137
Chipmunk, Northwestern 52, 53
Chipmunk, Yellow Pine 52, 53
Chipmunk, Yellow-pine 52, 53
Cinereus Shrew 10, 11
Clethrionomys gapperi 78, 79
Columbian Ground Squirrel 58, 59
Columbian Groundsquirrel 58, 59
Common Shrew 10, 11
Cottontail, Mountain 46, 47
Cottontail, Nuttall's 46, 47
Cougar 130, 131
Coyote 102, 103
Deer Mouse 74, 75
Deer, Mule 138, 139
Deer, Whitetail 140, 141
Deer, White-tailed 140, 141
Dusky Shrew 14, 15
Elk, Rocky Mountain 136, 137
Eptesicus fuscus 34, 35
Erethizon dorsatum 98, 99
Ermine 116, 117
Euderma maculatum 38, 39
Felis concolor 130, 131
Fisher 114, 115
Fox, Red 104, 105
Fringed Bat 24, 25
Fringed Myotis 24, 25
Gapper's Red-backed Vole 78, 79
Glaucomys sabrinus 64, 65
Goat, M[illegible]tain 144, 145
Golden-m[illegible]ed Ground Squirrel 60, 61
Gopher, Northern Pocket 66, 67
Gray Wolf 100, 101
Great Basin Pocket Mouse 68, 69
Grizzly Bear 108, 109
Groundsquirrel, Cascade Mantled 60, 61
Groundsquirrel, Columbian 58, 59
Gulo gulo 122, 123
Hare, Snowshoe 48, 49
Hare, Varying 48, 49
Heather Vole 80, 81
Heather-vole, Mountain 80, 81
Hoary Bat 36, 37
Hoary Marmot 56, 57
House Mouse 93
Jackrabbit, White-tailed 50, 51
Lasionycteris noctivagans 32, 33
Lasiurus cinereus 36, 37
Lemming, Northern Bog 90, 91
Lepus americanus 48, 49
Lepus townsendii 50, 51
Lion, Mountain 130, 131
Little Brown Bat 18, 19
Little Brown Myotis 18, 19
Long-eared Bat 22, 23
Long-eared Myotis 22, 23
Long-tailed Vole 86, 87
Long-tailed Weasel 118, 119

Lutra canadensis 128, 129
Lynx 132, 133
Lynx canadensis 132, 133
Lynx rufus 134, 135
Lynx, Bay 134, 135
Lynx, Canada 132, 133
Marmota caligata 56, 57
Marmota flaviventris 54, 55
Marmot, Hoary 56, 57
Marmot, Yellow-bellied 54, 55
Marten 112, 113
Marten, American 112, 113
Martes americana 112, 113
Martes pennanti 114, 115
Masked Shrew 10, 11
Meadow Jumping Mouse 94, 95
Meadow Vole 82, 83
Mephitis mephitis 126, 127
Microtus longicaudis 86, 87
Microtus montanus 84, 85
Microtus pennsylvanicus 82, 83
Mink 120, 121
Mink, American 120, 121
Montane Shrew 14, 15
Montane Vole 84, 85
Moose 142, 143
Moose, American 142, 143
Mountain Cottontail 46, 47
Mountain Goat 144, 145
Mountain Heather-vole 80, 81
Mountain Lion 130, 131
Mountain Sheep 146, 147
Mountain Vole 84, 85
Mouse, Deer 74, 75
Mouse, Great Basin Pocket 68, 69
Mouse, House 93
Mouse, Meadow Jumping 94, 95
Mouse, Western Harvest 72, 73
Mouse, Western Jumping 96, 97
Mouse, White-footed 74, 75
Mule Deer 138, 139
Mus musculus 93
Muskrat 88, 89
Mustela erminea 116, 117
Mustela frenata 118, 119
Mustela vison 120, 121
Myotis californicus 28, 29
Myotis ciliolabrum 30,31
Myotis evotis 22, 23
Myotis leibii 30, 31
Myotis lucifugus 18, 19
Myotis thysanodes 24, 25
Myotis volans 26, 27
Myotis yumanensis 20, 21
Myotis, California 28,29
Myotis, Fringed 24, 25
Myotis, Little Brown 18, 19
Myotis, Long-eared 22, 23
Myotis, Long-legged 26, 27
Myotis, Small-footed 30, 31
Myotis, Western Small-footed 30, 31
Myotis, Yuma 20, 21
Navigator Shrew 16, 17
Neotoma cinerea 76, 77
Northern Bog Lemming 90, 91
Northern Bog-lemming 90, 91
Northern Flying Squirrel 64, 65
Northern Pocket Gopher 66, 67
Northwestern Chipmunk 52, 53
Norway Rat 92
Nuttall's Cottontail 46, 47
Ochotona princeps 44, 45
Odocoileus hemionus hemionus 138, 139
Odocoileus virginianus 140, 141
Ondatra zibethicus 88, 89
Oreamnos americanus 144, 145
Otter, Canadian River 128, 129
Otter, River 128, 129
Ovis canadensis 146, 147
Pack Rat 76, 77
Pallid Bat 40, 41
Perognathus parvus 68, 69
Peromyscus maniculatus 74, 75
Phenacomys intermedius 80, 81
Pika 44, 45
Pika, American 44, 45
Pika, Rocky Mountain 44, 45
Plecotus townsendii 42, 43
Porcupine 98, 99
Porcupine, American 98, 99
Procyon lotor 110, 111
Rabbit, White-tailed Jack 50, 51
Raccoon 110, 111
Rattus norvegicus 92
Rat, Bushy-tailed Wood 76, 77
Rat, Norway 92
Rat, Pack 76, 77
Red Fox 104, 105
Red Squirrel 62, 63
Reithrodontomys megalotis 72, 73
River Otter 128, 129
Rocky Mountain Elk 136, 137
Rocky Mountain Pika 44, 45
Sheep, Bighorn 146, 147
Sheep, Mountain 146, 147
Short-tailed Weasel 116, 117
Shrew, American Water 16, 17
Shrew, Cinereus 10, 11
Shrew, Common 10, 11
Shrew, Dusky 14, 15
Shrew, Masked 10, 11
Shrew, Montane 14, 15
Shrew, Navigator 16, 17
Shrew, Vagrant 12, 13

Shrew, Wandering 12, 13
Shrew, Water 16, 17
Silver-haired Bat 32, 33
Skunk, Striped 126, 127
Small-footed Bat 30, 31
Small-footed Myotis 30, 31
Snowshoe Hare 48, 49
Sorex cinereus 10, 11
Sorex monticolus 14, 15
Sorex palustris 16, 17
Sorex vagrans 12, 13
Southern Red-backed Vole 78, 79
Spermophilus columbianus 58, 59
Spermophilus saturatus 60, 61
Spotted Bat 38, 39
Squirrel, American Red 62, 63
Squirrel, Cascade Golden-mantled Ground 60, 61
Squirrel, Columbian Ground 58, 59
Squirrel, Golden-mantled Ground 60, 61
Squirrel, Northern Flying 64, 65
Squirrel, American Red 62, 63
Squirrel, Red 62, 63
Stoat 116, 117
Striped Skunk 126, 127
Sylvilagus nuttalli 46, 47
Synaptomys borealis 90, 91
Tamias amoenus 52, 53
Tamiasciurus hudsonicus 62, 63
Taxidea taxus 124, 125
Thomomys talpoides 66, 67
Townsend's Big-eared Bat 42, 43
Ursus americanus 106, 107
Ursus arctos 108, 109
Vagrant Shrew 12, 13
Varying Hare 48, 49
Vole, Boreal Redback 78, 79
Vole, Gapper's Red-backed 78, 79
Vole, Heather 80, 81
Vole, Long-tailed 86, 87
Vole, Meadow 82, 83
Vole, Montane 84, 85
Vole, Mountain 84, 85
Vole, Southern Red-backed 78, 79
Vulpes vulpes 104, 105
Wandering Shrew 12, 13
Wapiti 136, 137
Water Shrew 16, 17
Weasel, Long-tailed 118, 119
Weasel, Short-tailed 116, 117
Western Big-eared Bat 42, 43
Western Harvest Mouse 72, 73
Western Jumping Mouse 96, 97
Western Small-footed Myotis 30,31
Whistler 56, 57
Whitetail Deer 140, 141
White-footed Mouse 74, 75
White-tailed Deer 140, 141
White-tailed Jackrabbit 50, 51
White-tailed Jack Rabbit 50, 51
Wolf 100, 101
Wolf, Gray 100, 101
Wolverine 122, 123
Woodrat, Bushy-tailed 76, 77
Yellow Badger 124, 125
Yellow Pine Chipmunk 52, 53
Yellow-bellied Marmot 54, 55
Yellow-pine Chipmunk 52, 53
Yuma Bat 20, 21
Yuma Myotis 20, 21
Zapus hudsonius 94, 95
Zapus princeps 96, 97

5

Appendices

5. APPENDICES

Appendix 5.1 Phylogenetic Listing

The following taxonomic list attempts to follow an acceptable phylogenetic sequence (Honacki *et al.* 1982). References for common names follows Jones *et al.* (1982) as recommended for provincial standards in Campbell and Harcombe (1985).

CLASS: MAMMALIA (Mammals)

ORDER: INSECTIVORA (Shrews and Moles)

FAMILY: SORICIDAE (Shrews)

Masked Shrew	*Sorex cinereus*
Vagrant Shrew	*Sorex vagrans*
Dusky Shrew	*Sorex monticolus*
Water Shrew	*Sorex palustris*

ORDER: CHIROPTERA (Bats)

FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)

Little Brown Myotis	*Myotis lucifugus*
Yuma Myotis	*Myotis yumanensis*
Long-eared Myotis	*Myotis evotis*
Fringed Myotis	*Myotis thysanodes*
Long-legged Myotis	*Myotis volans*
California Myotis	*Myotis californicus*
Western Small-footed Myotis	*Myotis ciliolabrum*
Silver-haired Bat	*Lasionycteris noctivagans*
Big Brown Bat	*Eptesicus fuscus*
Hoary Bat	*Lasiurus cinereus*
Spotted Bat	*Euderma maculatum*
Pallid Bat	*Antrozous pallidus*
Townsend's Big-eared Bat	*Plecotus townsendii*

ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)

FAMILY: OCHOTONIDAE (Pikas)

Pika	*Ochotona princeps*

FAMILY: LEPORIDAE (Rabbits and Hares)

Nuttall's Cottontail	*Sylvilagus nuttalli*
Snowshoe Hare	*Lepus americanus*
White-tailed Jackrabbit	*Lepus townsendii*

ORDER: RODENTIA (Squirrels, Rats, Mice, and Allies)

FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)

Yellow-pine Chipmunk	*Tamias amoenus*
Yellow-bellied Marmot	*Marmota flaviventris*
Hoary Marmot	*Marmota caligata*
Columbian Ground Squirrel	*Spermophilus columbianus*
Cascade Golden-mantled Ground Squirrel	*Spermophilus saturatus*
Red Squirrel	*Tamiasciurus hudsonicus*
Northern Flying Squirrel	*Glaucomys sabrinus*

FAMILY: GEOMYIDAE (Pocket Gophers)	
Northern Pocket Gopher	*Thomomys talpoides*
FAMILY: HETEROMYIDAE (Pocket Mice)	
Great Basin Pocket Mouse	*Perognathus parvus*
FAMILY: CASTORIDAE (Beavers)	
Beaver	*Castor canadensis*
FAMILY: CRICETIDAE (Deer Mice and Allies)	
Western Harvest Mouse	*Reithrodontomys megalotis*
Deer Mouse	*Peromyscus maniculatus*
Bushy-tailed Woodrat	*Neotoma cinerea*
FAMILY: ARVICOLIDAE (Voles, Lemmings, and Allies)	
Southern Red-backed Vole	*Clethrionomys gapperi*
Heather Vole	*Phenacomys intermedius*
Meadow Vole	*Microtus pennsylvanicus*
Montane Vole	*Microtus montanus*
Long-tailed Vole	*Microtus longicaudus*
Muskrat	*Ondatra zibethicus*
Northern Bog Lemming	*Synaptomys borealis*
FAMILY: MURIDAE (Old World Rats and Mice)	
Norway Rat	*Rattus norvegicus*
House Mouse	*Mus musculus*
FAMILY: ZAPODIDAE (Jumping Mice)	
Meadow Jumping Mouse	*Zapus hudsonius*
Western Jumping Mouse	*Zapus princeps*
FAMILY: ERETHIZONTIDAE (New World Porcupines)	
Porcupine	*Erethizon dorsatum*
ORDER: CARNIVORA (Carnivores)	
FAMILY: CANIDAE (Foxes, Wolves, and Allies)	
Gray Wolf	*Canis lupus*
Coyote	*Canis latrans*
Red Fox	*Vulpes vulpes*
FAMILY: URSIDAE (Bears)	
Black Bear	*Ursus americanus*
Grizzly Bear	*Ursus arctos*
FAMILY: PROCYONIDAE (Raccoons)	
Raccoon	*Procyon lotor*

FAMILY: MUSTELIDAE (Weasels, Badgers, and Allies)

Marten	*Martes americana*
Fisher	*Martes pennanti*
Ermine	*Mustela erminea*
Long-tailed Weasel	*Mustela frenata*
Mink	*Mustela vison*
Wolverine	*Gulo gulo*
Badger	*Taxidea taxus*
Striped Skunk	*Mephitis mephitis*
River Otter	*Lutra canadensis*

FAMILY: FELIDAE (Cats)

Cougar	*Felis concolor*
Lynx	*Lynx canadensis*
Bobcat	*Lynx rufus*

ORDER: ARTIODACTYLA (Even-toed Ungulates)

FAMILY: CERVIDAE (Cervids)

Elk	*Cervus elaphus*
Mule Deer	*Odocoileus hemionus*
White-tailed Deer	*Odocoileus virginianus*
Moose	*Alces alces*

FAMILY: BOVIDAE (Bovids)

Mountain Goat	*Oreamnos americanus*
Bighorn Sheep	*Ovis canadensis*

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Appendix 5.3 Glossary

Aestivation: dormancy during the summer.

Boreal: general term relating to northern geographic regions.

Carnivore: flesh-eating animal. Carnivorous mammals are primarily adapted for predation as evidenced by dentition and jaw articulation.

Carrion: any dead animal matter.

Crepuscular: active during the twilight periods of dusk and dawn.

Delayed implantation (embryonic diapause): condition when fertilized egg floats freely in uterus for some months, undergoing only limited development, before attaching to uterus and continuing development.

Diurnal: active during the daylight hours.

Dormant: state of inactivity when in prolonged sleep (see hibernation).

Echolocation: location of objects by means of echos usually of supersonic sounds.

Forbs: herbaceous dicotyledenous plants.

Forest litter: dead and decaying vegetation less than 3 cm deep lying on forest floor.

Friable soil: easily crumbled or pulverized soil suitable for burrowing; usually well-aerated soil.

Graminoids: grasses and grass-like plants.

Herbaceous layer: subcanopy of forbs and graminoids with 10% cover.

Herbivore: animal that eats only vegetation.

Hibernaculum: site where animal hibernates or spends time in a dormant state.

Hibernation: a state of lethargy or dormancy assumed by some animals during periods of unfavourable climatic conditions. The condition is manifested by lowered metabolic rates, including lowered body temperature.

Home range: the area covered by an individual for all activities (e.g. feeding, reproduction, maintenance).

Juvenile dispersal: movement of young away from maternal home range.

Montane: pertaining to the biogeographic zone composed of moist, cool sites below timberline, dominated by coniferous trees.

Nocturnal: active only during the period of darkness.

Omnivore: animal that eats both animal and vegetable matter.

Parturition: birth.

Riparian inclusion: small stand of vegetation associated with permanent water, includes seeps.

Shrub layer: subcanopy of shrubs with greater than 10% cover.

Snags: dead or mostly dead standing trees.

Subnivean: under the snow.

Talus: slope formed by an accumulation of rock debris, often at the base of a cliff.

Territory: the portion of an individual's home range defended against others, usually members of the same species.

Thermal cover: cover of vegetation or other physical structure (e.g. cave, rocky outcrop, building) which provides an ameliorating effect from extremes of temperature.

Thicket: dense clump of coniferous and/or deciduous trees.

Torpor: a state of sluggishness, inactivity.

Appendix 5.4. List of Reviewers of Mammal Species Notes

Species notes for the listed animal groups were sent to the following species experts for review. Comments received varied, but the authors were responsible for any errors or misinterpretations. We would like to thank all of the following for their contributions.

Bats	D. Nagorsen, A. Harestad, M.B. Fenton, C.G.van Zyll de Jong
Rabbits and Allies	A. Harestad, T. Sullivan
Marmots, Ground Squirrels	A. Harestad, D. Nagorsen
Squirrels, Chipmunks	A. Harestad, T. Sullivan
Pocket Gophers	S. MacDonald, C. Maser
Beaver, Muskrat	A. Harestad, C. Maser
Porcupine	A. Harestad, T. Sullivan, R. Archibald
Coyote, Gray Wolf, Foxes	B. Saunders, F. Tompa, W. Munro, D. Eastman, J.Elliott
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Fisher, Marten	B. Saunders, R. Archibald, L. Stordeur, D.Steventon
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